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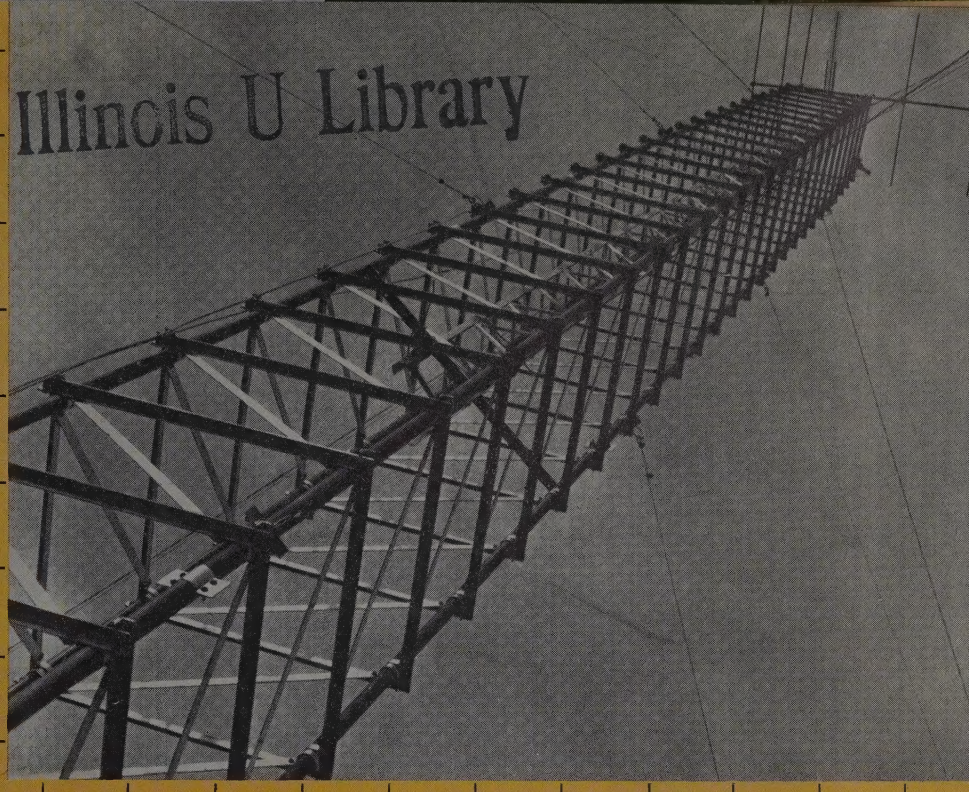

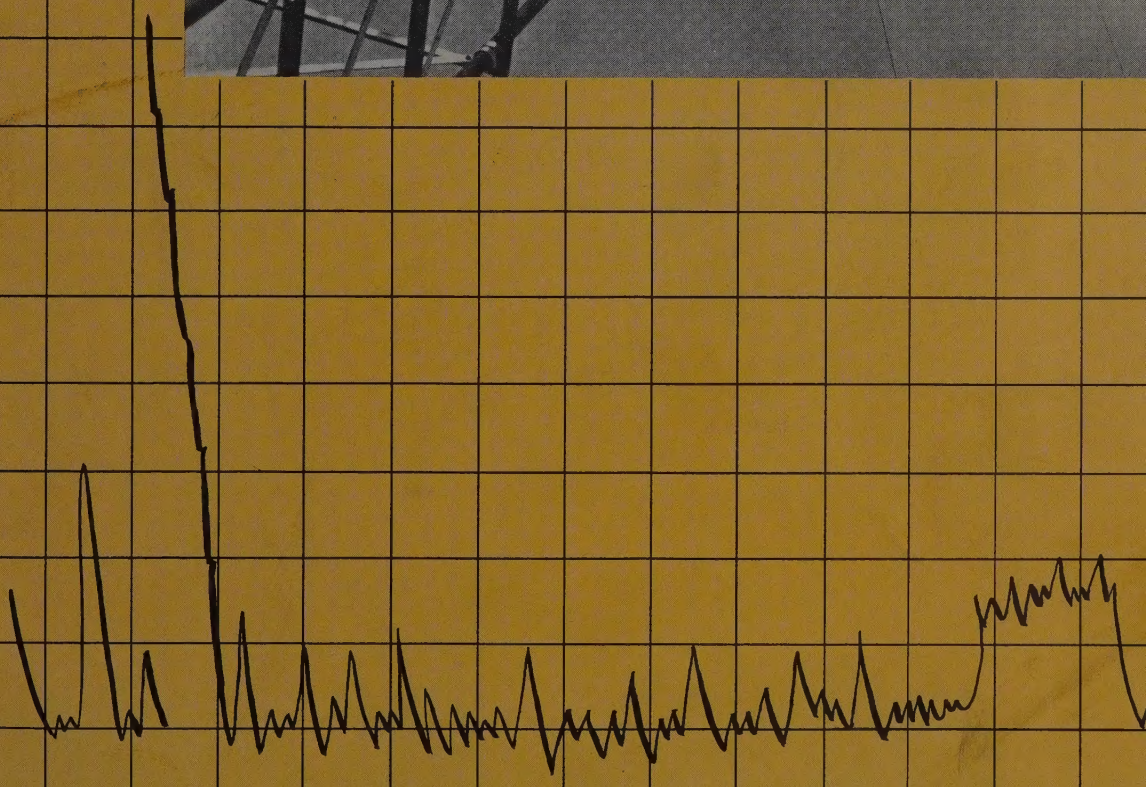

the **illinois technograph**

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october, 195

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For example, Socony-Vacuum's world-wide producing facilities have more than doubled—and refining capacity has increased nearly 50% since 1942—big build-up year of World War II.

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The Missing Pages In This Volume Are Advertisement

new developments

by Connie Minnich, C.E. '51

News on Color Television

RCA representatives appeared last spring before the Federal Communications Commission with an impressive demonstration of the long-sought color television. In its formulation of standards for the new development, the FCC listened to the RCA advocation of a possible set of three important standards: channel width, quality of picture and compatiability.

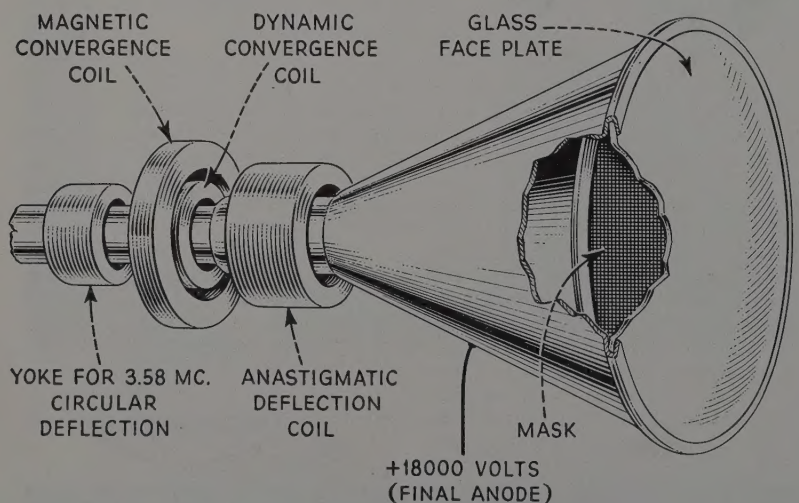
Already the FCC has tentatively adopted a channel width of six megacycles. The quality of color pictures, RCA pointed out, should not be inferior to those of the present black-and-white television. Compatiability refers to the adaptation of the new color television so that it could be shown in black and white on the 5,000,000 sets in American homes today, without any changes in these sets for the transmission cables.

RCA claimed that their own developments in color television met these three standards. They emphasized in particular, the fact that color could be sent, using their all-electronic system, over existing coaxial cables as well as over the new radio relay circuits. Color television is transmitted with ease over such relays, but the narrow frequency band width of present coaxial cables had before made this impossible.

Dr. Elmer Engstrom, vice president in charge of research of the RCA Laboratories, in his explanation of the performance of the color tube, said, "...the face of each tube is coated on the inside with multiplicity of dots of color phosphors. These dots are arranged in triangular groups of three—one red, one green and one blue. The total number of dots presently arranged on each tube face is 351,000 or 117,000 for each color. Behind the tube-face is a metal masking screen containing 117,000 holes of approximately the same size as the dots of color phosphor. The holes are so placed that they overlap equally each red, green and blue dot of a triangular group.

"As the electron gun, or guns, scans the face of the tube, electrons pass through the masking screen and activate the color phosphor dots, causing them to give off visible light . . . The amount of light in color given off by each dot varies in exact accordance with the information supplied from the video signals taken from the air. This action occurs so rapidly that the light from the activated color dots blends into the natural colors of the original scene."

A full-length article on color television and the story of its development will appear in a later issue of *Technograph.*

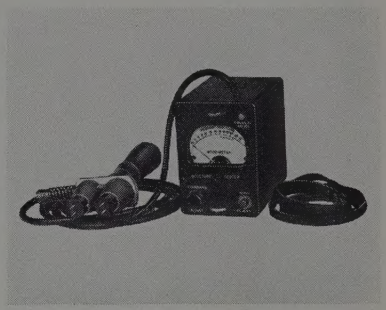


Video tube for color reception. (Courtesy RCA).

Midget Moisture Meter

A small portable, 4 lb, 4 in-cube instrument, known as the Tag Midget Moisture Meter, gives an instant reading of the per cent moisture content of both wood and plaster.

Weston Electrical product, the Midget is finding use in lumber mills and yards, wood fabrication plants, dry kiln sites and paint manufacturing plants as well as serving the needs of on-the-job estimates of building contractors and painters.



The midget moisture meter detects moisture from 7 to 30 per cent in wood or plaster.

Calibrated from 7 to 30 per cent moisture, the instrument has two needle electrodes that are pushed into the sample in the case of wood and that are removed for direct usage of the electrodes on plaster. Two ordinary batteries furnish the power.

Physics Books Proven Wrong

The old textbook theory that the melting and solidification points of a metal are the same has been given a gentle shove out the window by some of the recent experimental results of General Electric. The company's scientists have found that, in working with truly pure metals, the solidification point temperature is approximately 20 per cent lower than the melting point.

The old theory arose from the fact that a barest trace of impurity is sufficient to boost the temperature of the solidification point to that of the melting point. GE studies have been made using metal of a purity never found in Nature and rarely achieved by man before this time. By dividing an almost-pure metal sample into small microscopic droplets, a small amount of these are found to be totally pure and they then become the objects of observation.

(*Continued on page* 34)

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OUR COVER

The ILLINOIS TECHNOGRAPH starts the second half of this century with a new face. The irregular curve on the cover will be familiar to those people who read the newspapers in January, 1947, as the trace on the radar A-scope of the first radar pulse reflected off the moon. That luminous line unobtrusively ushered in a new era—it represents man's first feeble reaching into outr space. The havy pulse at the 12th square is IT—238,000 miles and back.

Appropriately enough, the initial cover photo in our new series shows the tallest antenna of the E.E. Building's group of research radiators, used in TV field strength investigation. The 60-foot tower on the 65-foot high building holds the antenna proper 125 feet above the ground.

Welcome . . .

CONNIE MINNICH
Editor

the Illinois Technograph

Are you . . .

. . . *a freshman?* A good bit of blurb could be said about these coming four years—"carefree college days" and "happiest years of my life" to mention a few. This " 'tween" time between stumbling youth and staunch maturity will necessitate some tough adjustments. This college life is not easy, but at the same time, the friends that you make here in college and the mad hectic schedule of fun and tough work that you all share in common will give you a store of memories for a dusty or rainy day in the future.

. . . *a sophomore?* College doesn't have the halo for you now that it did a year ago. You're used to the routine and can probably be entitled to begin the year with a very pat I've-seen-it-once sneer. Ditch any such attitude and keep in mind that this is NOW! If last year went down a scummy drain, you can scour out a new record for yourself; if last year brought home the bacon, then buy another can of elbow grease and keep the slate shining clean.

. . . *a junior?* This year will probably bring the first of those long-awaited design courses. Now that you have reached a semi-professional status, dig your nose into every technical magazine, professional society meeting, contact with older, experienced men that will help you to talk the jargon of the engineering world. The professional world will not open its door to you on the basis of your college degree; you have to crawl through the keyhole.

. . . *a senior?* At last the end of a long road is in sight. Little advice can be added to the heaps that will be thrown at you at graduation, so go out and pick your own honest peck of potatoes in the world. And may the best of luck go with you!

navigation

by James S. Stein, C.E. '51

(Illustrations by Author)

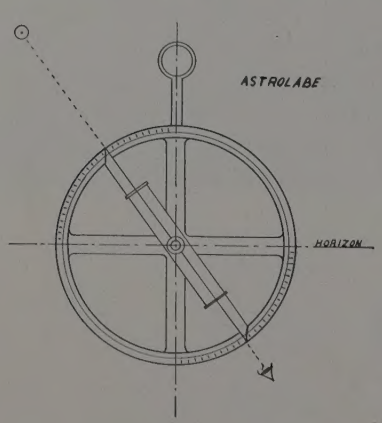
From historic novels, we know that when clippers and galleons sailed the Seven Seas, a good navigator was worth his weight in rubies since his skill depended upon his knowledge, common sense, and a few primitive instruments. If a cargo ship set sail for Boston and happened to land in New York instead, that was considered accurate navigation.

We also know that today, when a freighter is bound for Boston, it reaches Boston, because such things as the sextant, radar, and wireless radio exist. What is the link between these old and the new days? Consequently, how did our modern navigational guides come into being?

Navigation might be defined as "the art of fixing a ship's course and position at any time on a given voyage." Navigation is an *art* and not a *science*. Despite all of the instruments which are available today, navigation still remains as much of an art as it was in the time of Columbus.

At the time of Columbus, the navigator determined his position at sea by the use of the astrolabe and the compass and by dead reckoning. The two instruments were later developed into the sextant and the modern campass, and the principles of dead reckoning produced the chronometer.

The astrolabe was the antecedent of our modern sextant. It was used for measuring the altitude of the stars above the horizon, from which the ship's latitude was then determined. Although a very simple instrument, the astrolabe was extremely difficult to use at sea with good results. The instrument consisted of a metal circle suspended from a metal ring. At the center of the circle was a rotating arm with peep sights attached. When the instrument was held aloft by the ring, the force of gravity held the metal circle plumb. The rotating arm was then sighted at the sun or star, and the vertical reading was read off the scale at the outer edge of the circular ring. It took three men to operate the astrolabe on shipboard: one, with his thumb through the ring, held the instrument as steadily as possible; a second man pointed the sights at the sun; and a third read the altitude from the scale of degrees.



Ancient forerunner of the sextant was the cumbersome astrolabe that took three men to operate.

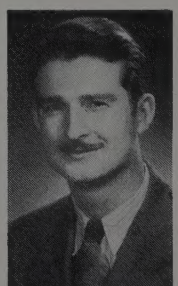
The first compass used at sea consisted of a magnetized steel needle fastened to a straw or cork and floated on a bowl of water. Such a compass was probably in use about 1200 A. D. By 1300 A. D. the compass had been greatly improved, and the needle then was suspended on a pivot and the instrument so arranged that the needle pointed toward the north no matter how the ship rolled. It was such a compass as this that Columbus used later on his voyage of discovery.

The only way the navigators of that day could find their longitude was by dead reckoning. To do this accurately, one had to have a reliable compass and some means of determining his speed. By know his true course and speed, the navigator could find the distance traveled east or west by triangulation. The navigator had to await the development of the chronometer before he could solve his problem of longitude by the use of spherical trigonometry.

The chart, perhaps cannot be classed as an instrument, but without it, accurate navigation instruments would be of small value. The Mercator chart and map, used by all navigators today, was the first chart on which a compass course appeared as a straight line. Based on a principle of expanded latitudes, the chart showed a distorted view of all polar regions. Its value lay in the fact that it was the first chart which a navigator could use to determine his course by drawing a straight line between the ship's position and destination.

The sextant, strangely enough, was invented by two men at the same time. Thomas Godfrey of Philadelphia and Captain Hadley of the British Navy were unknown to each other, so that both men have been given due credit. The principle of the sextant is quite simple. A mirror is rotated until the image of the sun is reflected on a horizon glass which is half mirror and half clear glass. The image is aligned in this glass until the sun or star seems to touch the horizon. The arc through which the mirror is rotated to bring about this desired condition is an indication of the angle of elevation.

The sextant has been greatly improved since the first one was made in 1730, but the principle upon which it operates is the same. A recent development has been the artificial horizon, which has proved a great advantage in places where fog is common and a clear horizon is often unobtainable. These new instruments are commonly called bubble sextants, since the artificial horizon is based on the use of a spirit level. However, these instruments are used very seldom on ships because they are not as accurate as an ordinary sextent and are much more expensive. Their chief use is on all aircraft where celestial navigation is used and where they are called octants, measuring arcs only up to 90 degrees.



JAMES S. STEIN

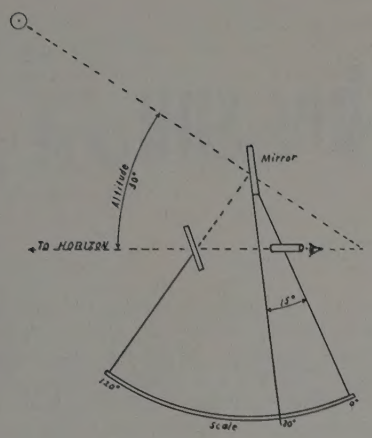
James Stein, or "Jim" as his C.E. friends know him, is an old Navy man of high standing, and, consiquently, well qualified to write on anything connected with navigation.

Shortly after his high school graduation, Jim entered the Navy in 1935 and served until 1939. In 1941, he returned to sea, joining the Merchant Marine as an able seaman. In April, 1945, he obtained his license as Master Mariner (Master or captain on steam and motor vessels of all gross tons upon any ocean).

He is president of Chi Epsilon, a member of Sigma Tau and Phi Eto Eigma.

Longitude determination is made today with the aid of the chronometer, a timepiece more accurately tuned than many expensive wrist watches. The entire system of modern navigation revolves around time. Time signals are obtainable every two hours by radio on almost any part of the ocean, and a ship today probably could navigate with a good pocket watch.

To determine the longititude at sea with the aid of the chronometer, the navigator must first know the exact position of the heavenly body he is observing. He must know within at least



SEXTANT

The above diagrammatic sketch shows the principle of the modern sextant.

one mile of the exact spot on earth that this star, or planet, or the sun, is directed above. If he knows the exact time, the aforementioned location is easy to compute by the use of a nautical almanac, which gives the positions of the various celestial bodies as computed for each hour of the day for every day of the year by astronomers. If the navigator knows the position of the star and takes its elevation above the horizon by the sextant, then subtracts this angle of elevation from 90 degrees, he has measured the arc of a great circle between himself and the spot on the earth below the star. Knowing his latitude, he then knows three sides of a spherical triangle, can compute his position on the face of the earth with reference to this spot, and obtain his longitude.

The required accuracy of a chronometer is one of the most decisive factors of navigation. The sun and stars have an apparent westward movement of 15 miles per hour, so that for every four seconds then that the chronometer is in error, the computed longitude of the ship is off one mile.

After the development of the chronometer and sextant, the navigator began to have some assurance that he could make the same port twice in a row. One has only to read the account of the early colonization of America to know the significance of this, for all too often a ship started out for Massachusetts and wound up in Virginia.

Now the navigator began the search for some method of determining the vessel's speed; for even with the aid of the sextant and chronometer, it was important to know by dead reckoning the approximate position of the ship. Very often it was necessary to sail for days without a sight of the sun or stars, so that the navigator still had to rely on the compass and the calculation of the ship's speed.

The first means of measuring speed was by the chip log. This consisted of a drag or chip tossed over the side and attached to a line that was allowed to run freely for 28 seconds. The number of knots (evenly spaced along the line) allowed to run out in that period indicated the speed.

There have been several types of taffrail logs developed which first came into usage around 1807. All of these logs indicated total mileage through means of a screw type rotor attached to a counting device.

The greatest revolution in navigation since the invention of the chronometer was brought about by the invention of the gyro-compass. This compass (first installed on a ship in 1911) greatly improved the ability of the navigator to run his courses by dead reckoning. Inasmuch as the gyro-compass seeks the true meridian, the navigator no longer has to correct for magnetic variation and deviation. The strong directive force of the gyro-compass made possible the development of the gyro-pilot which keeps the ship on its course automatically.

The advent of radio soon provided the navigator with an additional aid which is often his chief means of making a landfall in the North Atlantic in wintertime. The radio compass or "direction finder" makes use of a rotatable loop aerial and radio stations ashore. By listening to the identifying signals of the various shore stations and noting their direction from the ship, the navigator may plot his position with a fair degree of accuracy in the thickest fog.

Submarine bells are of great aid to ships in some channels. These bells make use of the fact that sound travels farther under water than through air. During foggy weather lightships and channel buoys sound bells under water, and the signals are picked up by two electrical "ears" placed forward in the bow of the ship below the waterline.

The fathometer or sonic depth finder is also an invaluable aid in locating position on well-charted coasts. It consists of a sounding device for recording the length of time required for a sound to leave the ship and bounce off of the

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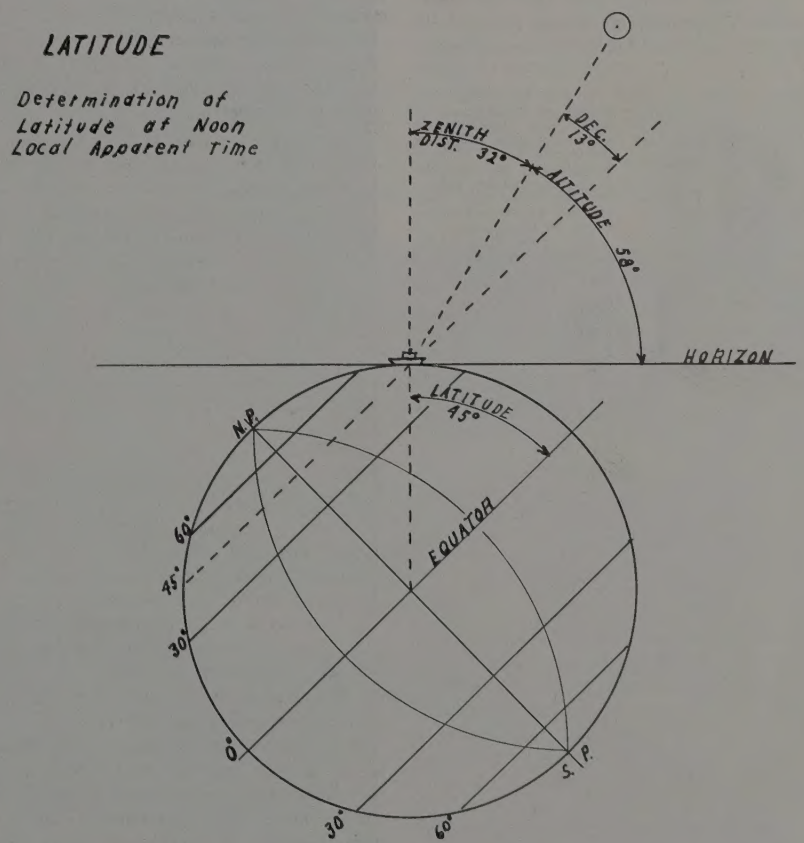


This diagram shows the principles involved in the determination of latitude with the aid of a sextant to measure the angles.

haymaking without the sun

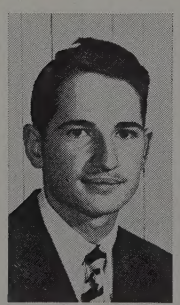
by John R. Huber, Ag.E. '52

Fire by spontaneous combustion is one of the greatest enemies of farmers. The proper drying and curing of hay stored in barns for the long winter months is a delicate and ticklish proposition.

Agricultural engineering advocates different methods of drying by forced air. The construction and operation of some of these methods are briefly discussed in this article.

The most highly mechanized and yet the least developed, relative to its potentialities, is the farming industry. Here indeed is a vast field for the versatile engineer. Versatile, for the engineering problems in agriculture include the factors of living organisms as well as those of inanimate objects. Farm improvements must be economical and the utmost in simplicity and yet be capable of doing the required task in a trouble-free manner.

This article deals with one such farm practice improvement whose design and construction could become much more complicated without appreciably improving its operation. The specific problem in question has to do with the mow curing of hay.



JOHN R. HUBER

In the old phrase of a master of ceremonies, "I have here one person whom I'm sure needs no introduction . . ." That is precisely the way we will present John Huber, whose articles have been pleasing TECH readers for going on three years.

John, a Galesburg alum, has been active as scribe for ASAE, co-editor of the AG.E. Annual, Phi Eta Sigma, Parade committee of the I SEE, and this year, will take on the duties of a TECH assistant editor.

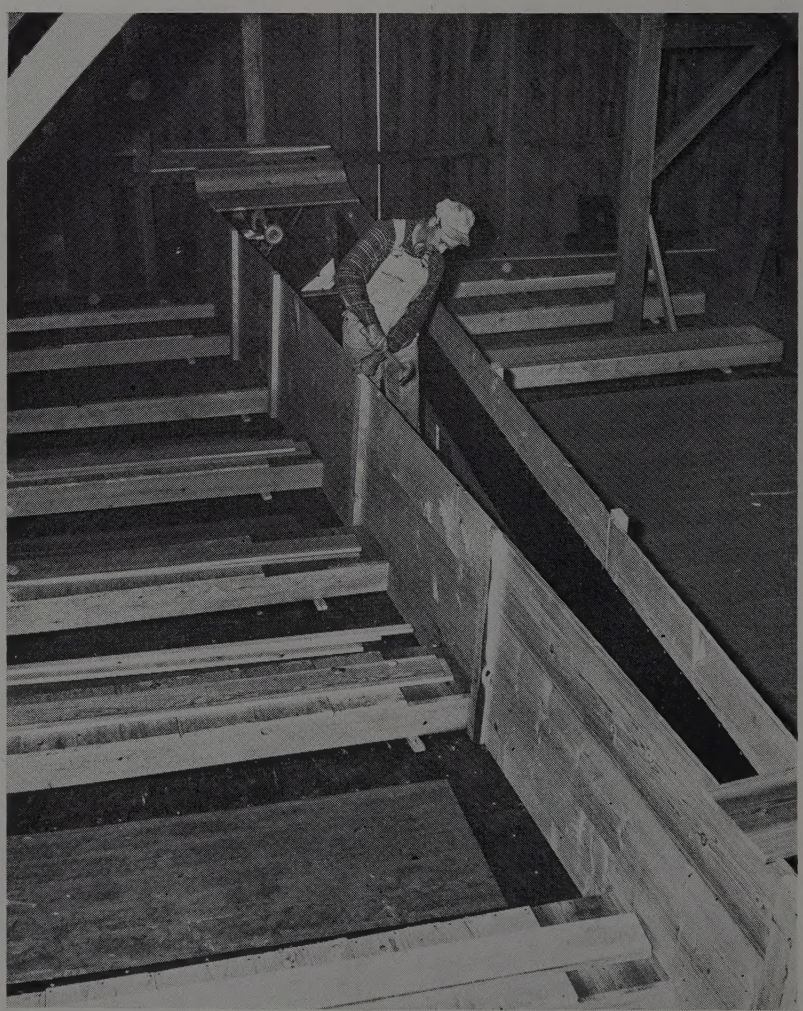
His is another one of the cases in which grades and activity work are both top-notch. A near 5.00 average is something we'd all like to have.

Hauling the damp hay to the barn for mechanical drying may seem to be a great waste of money for something that nature would do free, but this is not the case. As the proof of the pudding is in the eating, the proof of good hay is in the palatibility and nutrient content. It is in the effort to maintain the palatibility and conserve the nutrients that the curing of the hay is not left to the haphazard methods of Mother Nature.

Beautifully green, new-mown hay left to the mercy of the elements is bleached by the sun and blackened by rains. As the green pigment is lost, so is the protein (the most valuable nutrient in hay) and the carotene (source of vitamin A which is responsible for the golden yellow of butter). Natural weathering also causes the leaves to shatter off and be lost, thereby losing the plants' storehouses of energy. Much too often after Dame Nature has dried the hay to a safe storage level it is merely a mass of discolored stems which only a very hungry and very disgusted cow will eat.

Thus it is an effort to improve on nature and control the quality of a very important feed that the present barn hay-curing systems signify. Their design features economy and simplicity

(*Continued on page* 30)



A central main duct system under construction. (Courtesy of Town and Country Photographers).

frosted crystal

by Tom Tucker, Ch.E. '53

The demand for precious gems, for use in industry as precision instrument bearings as well as in jewelry manufacture, has been steadily increasing.

We know that many such jewels are synthesized, but the actual word "synthesis" induces a blank in most minds. This article takes synthetic sapphires and reduces the mystery of their origin and composition from a high-flown chemical jargon to an every-day engineering language.

The jewels in your watch movement may be sapphires as far as anyone can discern; but the possibilities are ten to one that those jewels are synthetic. Like rubber, and other valuable natural resources, sapphire has been synthesized.

The synthetic sapphire must not be confused with imitations. Imitation stones are colored glass or stones of poor color which have been split and rejoined by a colored cement. Synthetic sapphires are identical in composition with the stones which nature makes in the intense heat and pressure of volcanos. The sapphire is ordinarily thought of as a blue stone, however, the ruby is identical to the sapphire, except for pigment, and will be treated with the sapphire.

Sapphires are crystals of corundum, which is a form of aluminum oxide, Al_2O_3. The color of the stone depends upon the impurities present. Analysis of a natural blue sapphire shows 97 to 99 per cent corundum, up to 2 per cent ferric oxide, and up to 1 per cent silicon oxide. A synthetic blue stone contains about 99.8 per cent corundum, traces of ferric oxide, and about .1 per cent titanium oxide. The only difference in these stones is in the actual coloring matter. The colors are identical, and for this reason experts cannot distinguish the artificial from the natural stone by visual inspection. Chemical analysis is useless for the stone is ruined in the process.

The only certain way to differentiate between synthetic and natural stones is by the use of the Coolidge cathode ray tube. When stones are exposed to the rays from this tube, they glow. The natural stones cease to glow after being removed from the rays, but artificial stones continue to glow for some time. Differences in the glow of stones can tell an expert from which mine or factory a stone came.

From the time that man discovered the simple composition of sapphires, there have been numerous attempts to produce them in the laboratory. One of the earliest attempts consisted of dissolving alumina, pure aluminum oxide, infused borax or boric acid. The resulting solution was cooled and corundum crystalized out in flat hexagonal plates, too thin for any use.

In 1819, Dr. E. D. Clarke placed two rubies in the flame of an oxy-hydrogen blow-pipe and obtained a single stone. Committing the cardinal sin of science, Dr. Clarke assumed that the two stones had fused together as two pieces of glass will do and did not investigate any further. However, a citizen of Geneva realized in 1885 that the product of fusing ruby chips was a single, larger crystal. As a result, reconstructed rubies were sold in Europe for true rubies until reputable gem dealers stopped their sale. The blue sapphire cannot be reconstructed because the color is lost.

TOM TUCKER

A musician as well as a darn good chemical engineer is a rare achievement at college, but Tom Tucker is one person who seems to have effected this.

Tom is now a member of the University concert and football bands and of the Men's Glee Club, as well as being active in AIChE and the committees of last year's I SEE. With all these activities he still maintained a sufficiently high average for Phi Eta Sigma to claih him as one of its own. Another of his scholastic honors was the honorable mention that he won in the 1949 George Westinghouse scholarship examinations.

Making use of his knowledge of reconstructed rubies, Verneuil developed the method of synthesis that is in use at present. Verneuil directed powdered alumina down through the flame of an inverted oxy-hydrogen torch. In the flame, the alumina melted to form drops which solidified upon cooling below the flame. By causing succeeding drops to solidify upon the first, a large crystal of sapphire was produced.

The furnace for the manufacture of synthetic sapphires is rather simple in

(*Continued on page 22*)

Pride of Bell Labs is the five-ounce crystal of synthetic quartz, right, largest ever grown. Left, natural quartz. (Courtesy of Fortune).

Introducing . . .

by Jack Ullman, Charles Flanders and Tom Tucker

CARL G. BLANYER

"I," said Gene Blanyer, "have led a perfectly humdrum existence. Haven't done a thing and never expect to."

Some people might argue with this statement, particularly those who know that he has done enough to accumulate on his key chain the keys of the honoraries: Phi Eta Sigma, Sigma Tau, Tau Beta Pi, Eta Kappa Nu, Pi Mu Epsilon, and Phi Kappa Phi.

Carl Gene Blanyer is a senior in electrical engineering and is now associate editor of the Technograph. He is from Mount Olive, Illinois, a place which he describes as "a little bitty town." His hobby is, as he puts it, "building radios and junk," and his greatest contribution to electronic science to date is his part in the development of that useful research tool, the Kissometer.

Gene is a veteran, having joined the Navy in 1945. He spent most of his time in the Navy receiving training as a radio technician. "My only sea duty," he says, "was a period as a paid passenger on the excursion steamer, 'Mount Vernon'."

CARL G. BLANYER

When Blanyer left the Navy and came to Illinois, the local housing shortage was at its peak, and for two years he lived in a trailer. This seems to have had little effect upon his average, which was, and is, just a smidgin below five point. In addition to his school work, Gene has been active in AIEE-IRE (of which he is now chairman), the Illinois Society of Professional Engineers and, of course, the Technograph. He holds a John Morris Memorial Fund Scholarship. After graduation? "Graduate school," he says with a smile.

PROF. H. E. BABBITT

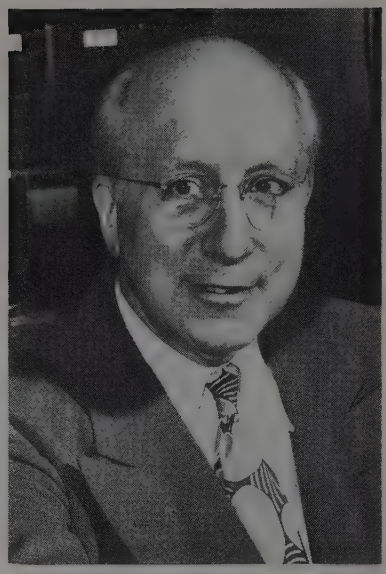
A well-known story around the civil engineering department goes something like this: At a recent annual convention of the Illinois Society of Professional Engineers in Decatur, one of the older members who had given outstanding service to the society for the past 25 years as its secretary-treasurer, was awarded a beautiful pen-and-holder set. An additional gift was a handsome watch. In the ensuing few minutes of silence while he cleared his voice to express thanks, he was told, "Next time we'll give you the works."

Laughing whenever he is reminded of this story, Professor Harold E. Babbitt proudly shows off the watch and vows that it is in good running order, even, as he was told, he wasn't at that time given "the works." As a professor of sanitary engineering, he is a familiar figure in civil engineering circles throughout the country as well as all engineering circles here in Illinois.

After graduating from Somerville English High School, Somerville, Mass., Professor Babbitt spent two years in a sub-professional job in the electrification of the Long Island railroad. During this time he attended Cooper Union Night school in New York. Matriculation at the Massachusetts Institute of Technology resulted in a bachelor's degree for him in June, 1911.

He then came west to work for the Sanitary District of Chicago and, later, for the Ohio State Department of Public Health. In 1913 he came to this campus as an instructor and, except for a stint in the Army during World War I, has been here ever since.

Since 1924, Professor Babbitt has been secretary-treasurer of the Illinois Society of Professional Engineers, of which he is now an honorary member. In 1922 he was vice-president of ISPE and in 1923, president.



PROF. H. E. BABBITT

He is a member of Tau Beta Pi, Sigma Tau, Sigma Xi, Tau Epsilon, Mu San, and is an honorary member of Sigma Phi Delta. He is also a member of the following professional groups: National Society of Professional Engineers; American Society of Civil Engineers; American Chemical Society; Ameican Public Health Association; Federation of Associated Sewage Works; and the American Society for Engineering Education.

Books written by Professor Babbitt include *Sewerage and Sewage Treatment, Plumbing,* and *Water Supply Engineering,* with J. J. Doland. He has also written many University bulletins.

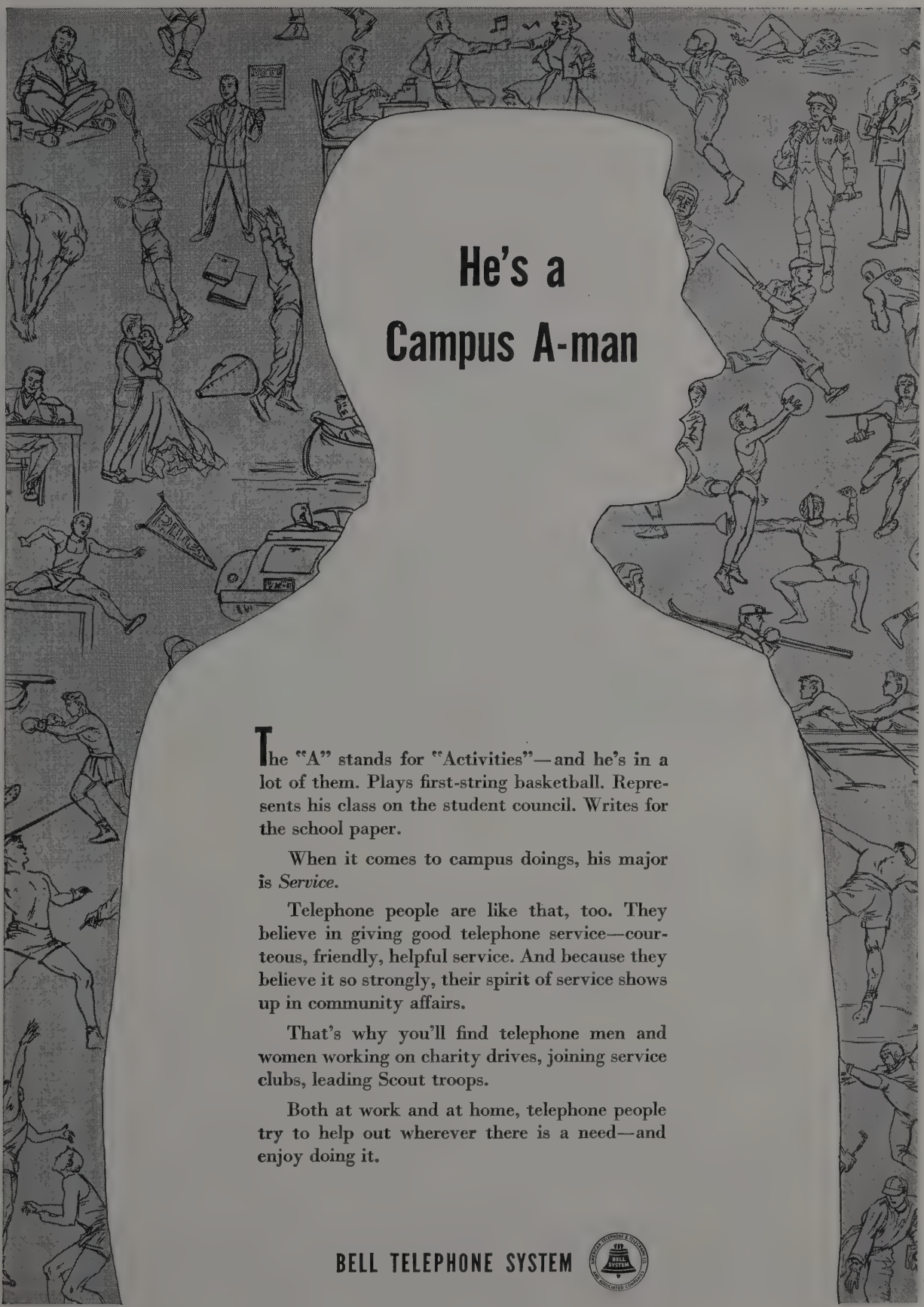
On leave from the University for this semester, Professor Babbitt usually does almost all graduate teaching.

ERROL D. RODDA

The one factor which has probably altered Errol Rodda's college career more than anything else is his love for the "outdoors." When Errol first enrolled as a freshman at the University of Illinois four years ago, he chose to major in engineering physics. However, after finishing his second year at the University, he found that he disliked the "cooped-up" laboratory work of a physicist and enrolled as a major in agricultural engineering with a construction option.

Errol Rodda typifies the exceptional all-around student. At present he is the ASAE representative to and presi-

(*Continued on page* 34)



He's a Campus A-man

The "A" stands for "Activities"—and he's in a lot of them. Plays first-string basketball. Represents his class on the student council. Writes for the school paper.

When it comes to campus doings, his major is *Service.*

Telephone people are like that, too. They believe in giving good telephone service—courteous, friendly, helpful service. And because they believe it so strongly, their spirit of service shows up in community affairs.

That's why you'll find telephone men and women working on charity drives, joining service clubs, leading Scout troops.

Both at work and at home, telephone people try to help out wherever there is a need—and enjoy doing it.

BELL TELEPHONE SYSTEM

The Engineering Honoraries and Societies

ENGINEERING COUNCIL

Engineering Council consists of representatives from each of the twelve engineering professional societies that have student chapters here on campus. Its purpose is to coordinate inter-society activities and to promote the general welfare of the engineering student body. Such activities sponsored by the Engineering Council last year were the Illinois Student Engineering Exhibit (I SEE), the Engineering Parade, and the St. Pat's Ball, all given the weekend of April 31-May 1.

At present, the Council is actively working on a plan that may eventually excuse graduating seniors from final exams. Other plans for the current year will include the formulation of an Engineering Weekend, which will include St. Pat's Ball, together with an All-Engineering Convocation.

At the last meeting of the spring semester, the following were elected to serve as officers for the duration of the fall semester: Erroll Rodda, president; Al Makulec, vice president; Adolph Brux, corresponding secretary; Bob Johnson, recording secretary; and Gerald Slusser, treasurer.

AIEE-IRE

The most important meeting of the year came last May for the student chapter of American Institute of Electrical Engineers—Institute of Radio Engineers when the national president of AIEE spoke to a combined gathering of their group and the Urbana section of AIEE. Mr. James F. Fairman, in his speech, "What a Year," presented the past, present, and future problems facing electrical engineers in industry. After the talk, nominations for officers from the nominating committee and the floor resulted in the following elections: Gene Blanyer, chairman; Bill Mueller, vice chairman; Jack Ritt, secretary; Cecil Boaz, treasurer; John Barnes, corresponding secretary for IRE; and Edwin Christianson, Engineering Council representative.

In sports, the AIEE-IRE bowling team copped the league championship cub in last spring's league intramural competition, with members Bob Compton, Bill Devore, Pete Ellew, Marvin Euler, John Fahlberg, Ed Macoiz and Russ Neilson piling up the team points. Another honor for the student chapter came when John Wood's paper, entitled "Electroencephalography," took second prize in the undergraduate division of the Technical Papers Competition at the AIEE District Convention.

Of public interest was the presentation of the Illinois Bell Telephone Company's "Words on Waves." Under the arrangements of AIEE-IRE, the program explained to an interested audience in the Lincoln Hall Theater last May 8th, the wonders of telephone and television transmission.

SIGMA PHI DELTA

Sigma Phi Delta, social engineering fraternity, will begin the new fall semester with the initiation of ten new pledges, who thoroughly, though not too willingly, cleaned the chapter house out a week before registration.

This year the fraternity plans to compete in all intramural sports, including football, basketball, and baseball. Four house dances also have been tentatively planned.

Officers who will head the chapter for the coming semester are: Adolph Brux, president; Don Hendricks, vice president; Jim Ephgrave, general manager; and Bill Heydrich, secretary.

AIChE

The young men with the test tubes and pipe wrenches find their kindred spirits in the American Institute of Chemical Engineers, which, despite the fact that it has its headquarters on South Campus in the new Chemical Engineering Building (officialy known as East Chemistry Building) does not prevent it from being one of the most active societies in North Campus activities.

One of the earliest meetings for this fall will be a smoker for a social mingling of old and new members. An annual Senior Banquet and beer bust are two of the items on the agenda for later meetings.

Ed Troscinski will head the group this year as its president; Leonard Nero takes over the vice presidency; Dick Dominetta will take dues as treasurer; and Bill Rutherford is Engineering Council representative.

PI TAU SIGMA

Founded here at the University of Illinois in 1915, Pi Tau Sigma, mechanical engineering honorary, was made national in scope in 1916 when mechanical engineering students from Illinois and Wisconsin met to form a national constitution. Today the organization has 51 chapters and a total membership of 12,000 throughout the country.

Members are selected on a basis of scholastic standing, leadership, personality, trustworthiness, industry, and probable future success in mechanical engineering. Two of the outstanding purposes of the organization are to foster high ideals of the engineering profession and to stimulate interest in coordinate departmental activities.

Officers are: Al Hallene, president; O. A. Jones, vice president; Pat Fahey, treasurer; Don Russell, recording secretary; and Wolfgang Junkel, corresponding secretary.

CHI EPSILON

Chi Epsilon is an organization with the broad objective of increasing the efficacy of the civil engineering profession as an instrument of social betterment. The selection of active members is based on scholarship, character, practicability, and sociability, the four requirements of a successful engineer.

Active membership is open to all students duly registered in the civil engineering courses and to students registered in associated courses such as general engineering and architectural engineering. Only those students who are ranked as juniors or seniors in good and regular standing and who have maintained an average grade in scholarship in the highest one-third of the class of those who are eligible for Chi Epsilon honors, shall be eligible for active membership.

New officers elected May 25, 1950, for the fall semester were: James Stein, president; Charles Swenson, vice president; Earnest Boulding, secretary; Stephen Kostecke, treasurer; Ronald Hoefle, editor; and Roy Peterson, associate editor.

Members initiated May 25, 1950,

(*Continued on page* 26)

Bright New World

FROM MORNING TILL NIGHT, the colors of the rainbow are all around you—through plastics. A blue plastic clock wakes you, and you flip on an ivory plastic light switch. You take your clothes from a yellow plastic hanger. Plastic toothbrushes come in colors for every member of the family. Cheerful decorating schemes are enhanced by the beauty of plastic drapes. There's no limit to the colors you can get in these versatile materials!

But this is only the start of the plastic story. Plastics help make better clothing. Modern furniture and furnishings owe much to plastics. Much of your food is packaged in clean, clear plastics. Plastics add safety, durability, and appearance to many of your electrical appliances.

These versatile basic materials are man-made. Organic chemicals are the ingredients of the "unfinished" plastics—called resins. From these resins come the many different forms of plastics we know.

The people of Union Carbide are leaders in the production of plastics, resins, and related chemicals. They also provide hundreds of other materials for the use of science and industry.

FREE: *If you would like to know more about many of the things you use every day, send for the illustrated booklet "Products and Processes." It tells how science and industry use UCC's Alloys, Chemicals, Carbons, Gases, and Plastics. Write for free booklet C.*

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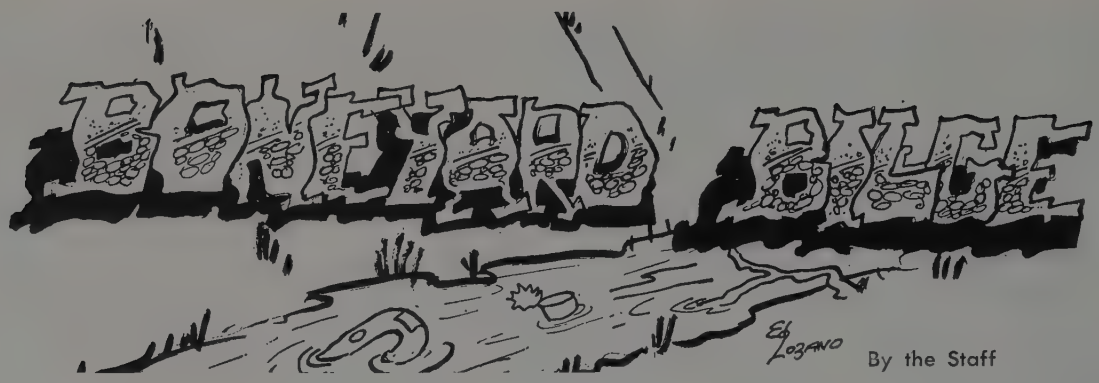
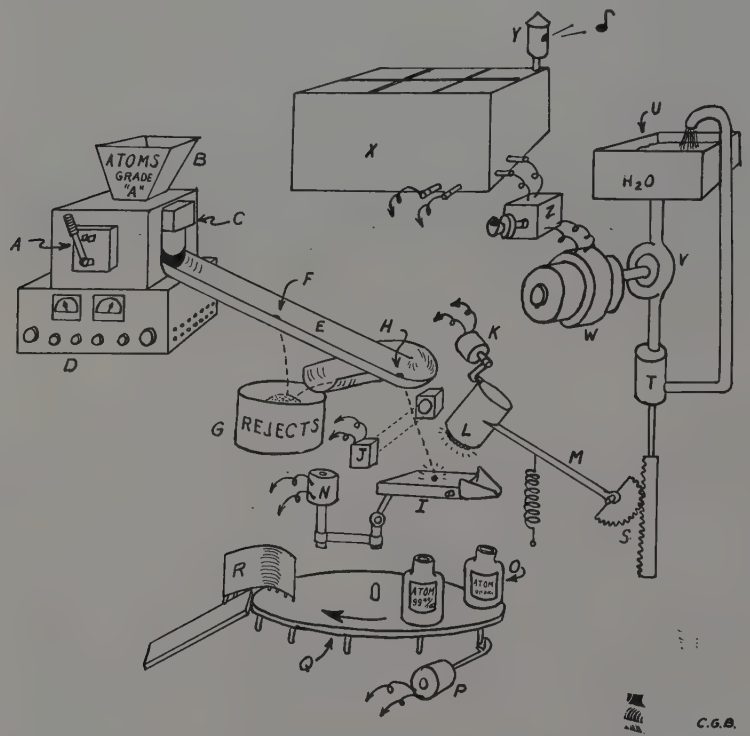


By the Staff

The operation of this device is quite simple; the primary consideration of the operator of this machine is: Does he want it on, or does he want it off? Thus, the heart of the machine is the on-off switch, A. This is operated in the usual way, preferably from a distance.

The *modus operandi* of the less important attachments connected to the on-off switch is as follows: Fresh atoms are dumped into hopper B. Guillotine type gate C is actuated by timer unit D, allowing atom to roll down through E. Faulty atoms are rejected as undersized atoms fall through "no-go" hole F, while oversized ones pass both holes; both types land in reject can G. Selected atoms fall through "go" hole H, landing on mashing plate I. In so doing they break light beam to photocell J which, acting through timer unit, energizes solenoid K, releasing diamond headed mallet L. Rebound of mallet, due to phosphor-bronze support leaf M, resets it for next cycle.



Solenoid N then tips mashing plate, dumping smithereens into waiting jar, O. Final solenoid P rotates table Q, positioning new bottle. Filled jars are swept off table by deflector R, sliding down ramp. At this time gate C is opened again, allowing next atom to be released.

Decent of mallet operates rack-and-pinion gearing S, causing one pulse of single-stroke pump T, which sends jet of water to storage tank U, keeping it filled. Water pours through turbine V continuously, turning generator W, which charges battery bank X. When bank is fully charged, whitle Y blows. Note is picked up by microphone on cut-out Z, disconnecting generator. Thus it is seen that the operation of this unit is not only completely automatic, but self-sustaining. There are three advantages of this type of atom-smasher over the conventional, or peasant, variety: It is (1) cheaper, (2) less expensive and, (3) more economical.

The material for this October issue of TECHNOGRAPH was compiled during the long summer months. A publication date that early is necessary, since at that time, all editorial matter must be covered by correspondence of letters three pages long rather than the usual five-minute calls.

Although the Bilge column should ordinarily cover points of local interest here on Engineering Campus, the editorial staff instead were asked to each contribute a short 100-word story about whaat they were doing, thinking, and seeing during the summer months.

* * *

For the Edisons

". . . so although my job as a draftsman is interesting, there is some time between rush jobs when I really have nothing to do and yet must look busy, since we have big clients coming in and out of the office through the drafting room every minute of the day.

"Luckily, these same clients never stop to look it your work. The Boss doesn't care what I do, so long as I keep that Quiet-Genius-at-Work look on my mug. The accompanying diagram is one of the inventions I dreamed up in my spare time. I have the gall to consider it self-explanatory.

"Need I say more? . . ."

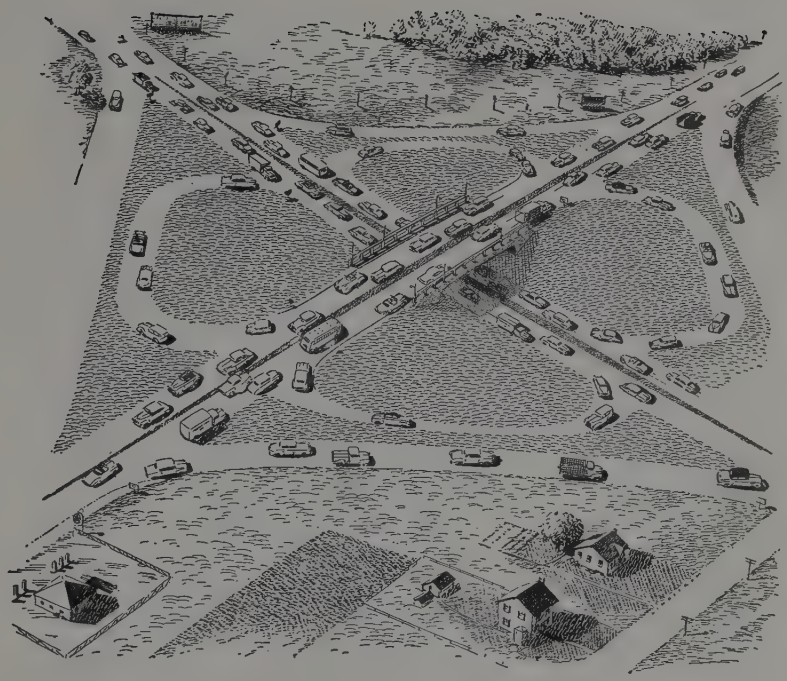
* * *

From the Scientific Point of View

". . . here is my wee short contribution for the *Bilge*.

"Over one hundred years ago, philosophers determined that light travels at the velocity of 192,000 miles per second. The method that they used to arrive at this figure was based on observations of the planet Jupiter. A rule was devised for the prediction of times of the eclipse at any time in the future. But it was soon discovered that the eclipses took place 16½ minutes sooner when Jupiter was on the same side of the sun as the earth than when it was on the opposite side. Therefore, they reasoned that it took the light 16½

(*Continued on page* 28)



The forgotten half billion

Roebling Aircord contributes importantly to safe, sure "control in the air".

Roebling Elevator Rope is the most widely used wire rope in elevator service.

Roevar Magnet Wire insulation is 10 to 40 times tougher than other types.

IT'S EASY to forget a product that gives almost flawless performance. Most people, for instance, never think of the valve springs in their cars... largely because wire developments have brought them to a point approaching metallurgical and mechanical perfection. The half billion valve springs in service today... closing each valve as often as 12 times a second, from sub-zero temperatures to 400°F... will prove almost 100 per cent dependable for years on end. Roebling is a chief supplier of round spring wire to valve spring manufacturers.

Today, too, Roebling's wide line of wires and wire products offer economies to *every* field of industry. A full range of high carbon specialty wires... wire rope for every sort of rope-rigged equipment... more than 60 types of electrical wire and cable... a complete range of woven wire screens. Write for information about the Roebling products of interest to you.

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A CENTURY OF CONFIDENCE

ENGINEERS' QUIZ

by Joe R. Beeler, Jr.

(Ed. Note—The following is a reprint from the March, 1948 issue of the Kansas Engineer. We are grateful to this magazine for permission to run this timely quiz.)

1. A recently disclosed military use for bats was that of carrying
   a. radar
   b. disease
   c. incendiaries
   d. messages

2. The "cancer university" is
   a. University of Chicago
   b. Harvard Medical School
   c. Manhattan Memorial Hospital

3. The chief plant form on Mars is supposed to be
   a. grass
   b. lichens
   c. tomatoes
   d. parsley

4. The 1947 "biggest salary" went to
   a. Ginger Rogers
   b. Charles Skouras
   c. Betty Grable
   d. Bing Crosby

5. The first boxing fatality of 1948 was
   a. Ezzard Charles
   b. Max Hirsch
   c. Sam Baroudi
   d. Jake Bogart

6. The K.U. Engineering Exposition will take place
   a. April 16-17
   b. April 16-17
   c. April 16-17
   d. April 16-17

7. A recent test used to select executives for industry contained the assumption that good executives are often motivated by
   a. money
   b. vacations
   c. frustration fears
   d. orange juice

8. The Haber process is used to make
   a. oxygen
   b. ammonia
   c. hydrogen
   d. nails

9. Babe Ruth made a home run grand total of about
   a. 450
   b. 550
   c. 650
   d. 750

10. The lowest spot in the United States is in
    a. Florida
    b. Texas
    c. California
    d. Colorado

11. The lowest spot in the world is in
    a. The U.S.
    b. Russia
    c. Palestine
    d. Africa

12. Cytology deals with the study of
    a. cells
    b. cytols
    c. cyclotrons
    d. air currents

13. Karl Marx was troubled by capitalism and
    a. poker
    b. boils
    c. flat feet
    d. chemistry

14. A Toucan is a tropical
    a. lizzard
    b. bird
    c. animal
    d. disease

15. The American Civil War ended in
    a. 1861
    b. 1863
    c. 1865
    d. 1867

16. The first American submarine was used in what war?
    a. Revolutionary
    b. 1812
    c. Mexican
    d. Civil

17. During the War of 1812 our president was
    a. Jefferson
    b. Madison
    c. Jackson
    d. Pakenham

18. Two-headed turtles usually die in their
    a. first year
    b. second year
    c. third year
    d. fifth year

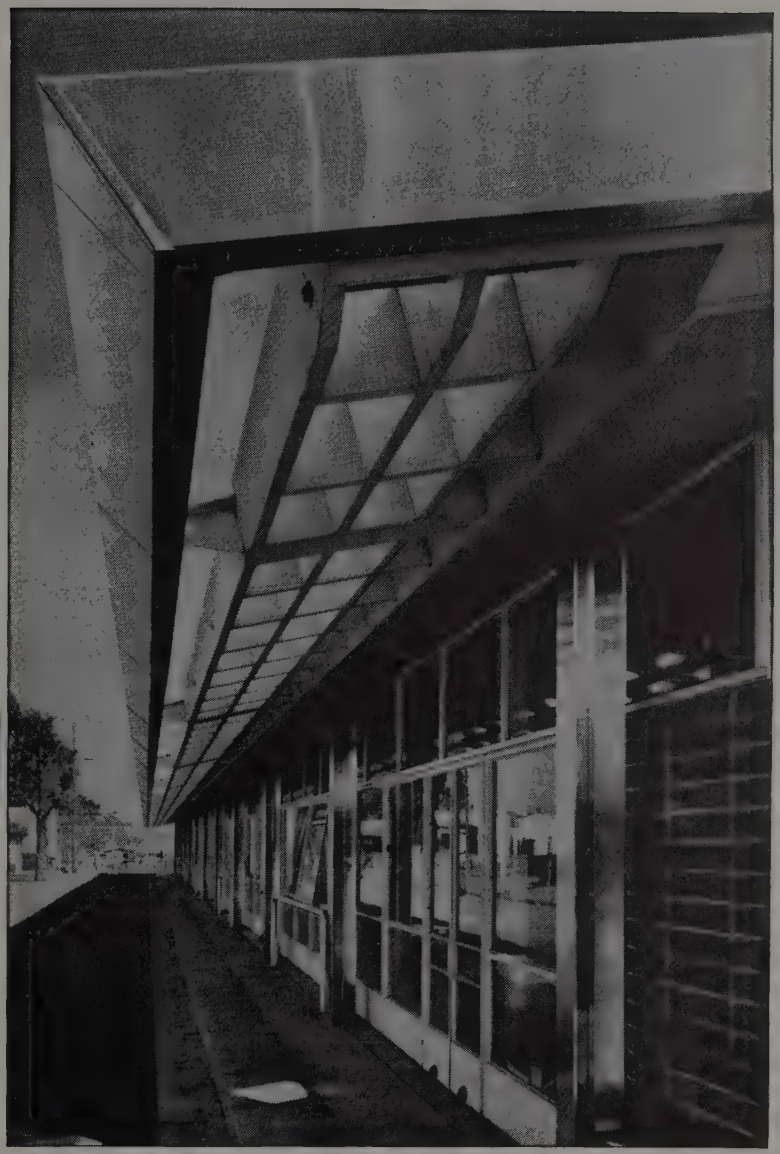
19. One of the most famous students of bird life was
    a. John Cox
    b. John Lewis
    c. John Barrymore
    d. John Audubon

20. In the horsetrading business a "hand" is equivalent to
    a. 12 inches
    b. 8 inches
    c. 2 feet
    d. 4 inches

Answers: 1-c; 2-c; 3-b; 4-b; 5-c; 6-a-b-c-d; 7-c; 8-b; 9-d; 10-c; 11-c; 12-a; 13-b; 14-b; 15-c; 16-a; 17-b; 18-a; 19-d; 20-d.

) well...

NEW ICE CREAM IDEA. In certain parts of the country, you can now buy individually packaged single servings of ice cream. They're called "Diced Cream"... and they strike a new high in sanitation, economy and convenience. Diced Cream is made in machines fabricated largely from stainless steel—to assure maximum purity in the finished product.



STAINLESS STEEL GOES TO SCHOOL. What a change from the little red schoolhouse! This new school in California embodies the latest features in school construction, including the use of U·S·S Stainless Steel for architectural trim. The stainless trim resists atmospheric corrosion, harmonizes with the building design. United States Steel produces steel of all kinds for such buildings . . . continuing its number-one job of helping to build a better America.

Listen to . . . The Theatre Guild on the Air, presented every Sunday evening by United States Steel. National Broadcasting Company, coast-to-coast network. Consult your newspaper for time and station.

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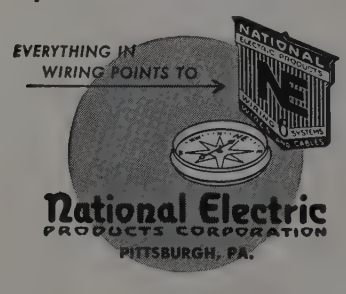
Pipe, itself, does not have all the properties required of a true electrical conduit. But National Electric processes a *special* steel pipe into a real quality conduit—Sherarduct.

Here's how:

1. Special high-grade steel is Spellerized—a kneading process that produces fine, even-textured steel.
2. The Spellerized steel is rolled into pipe, put through the Scale-Free process and pickled.
3. This specially treated pipe is Sherardized—an exclusive process of galvanizing that applies zinc to metal under heat. This affords permanent protection against rust.
4. A smooth "Shera-Solution" enamel is baked into the pores to give acid-resistant surfaces.

Then—and only then—do you have Sherarduct, a true conduit . . . long lasting, easily fished, rust proof, easily bent, strong, easy to handle.

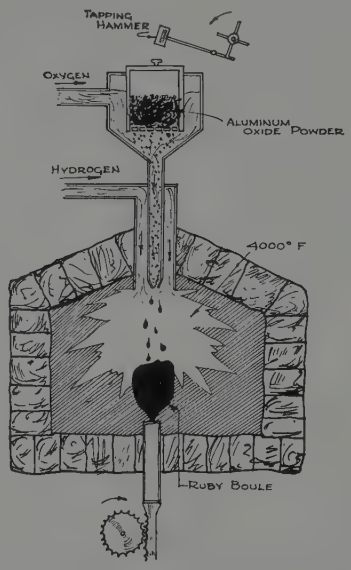
Sherarduct is only one of the many outstanding products made by National Electric—a reliable source of supply for your future electrical needs.



FROSTED CRYSTALS . . .

(*Continued from page* 11)

design. At the top is a container for the alumina. The bottom of this container is a fine screen. An automatic trip hammer is placed so that it can strike the alumina chamber. Below this container is the burner of fireclay. This burner is a cyclinder about ten inches



The great sapphire furnace. Aluminum oxide sifts down through an oxyhydrogen flame, melts, then slowly builds up into a crystal chunk called a boule. (Courtesy of Fortune).

high and six inches in diameter, and the alumina enters the combustion chamber with the oxygen. Hydrogen enters the chamber from the side. A movable stick of fire-clay enters the bottom of the furnace. The sapphire is built on this stick.

In operation, the trip-hammer forces a measured amount of alumina through the screen into the oxygen stream. This mixture flows down to the combustion chamber where the oxygen meets the hydrogen and the two burst into flame. In the intense heat, 2000 degrees centigrade, the alumina fuses and drops to the fire-clay stick. The stick is then lowered and the corundum allowed to solidify. When the crystal has formed, the stick is raised and the process repeated. By rotating the stick, a long, radish-shaped crystal is formed. This crystal is known as a boule. The greatest problems in the process are the following: the alumina must be absolutely pure (except for the pigment), the alumina must flow to the burner in even amounts, and the temperature must remain constant.

The sapphire boule is colored only when it is to be used in jewelry or watch-bearings. Addition of chromium oxide makes a red stone. Yellow may be due to iron or nickel oxides. Vanadium oxide causes a yellow-green. The presence of potassium compounds brings about an undesirable brown. If as little as .0005 per cent of magnesium oxide is present, a brick-red stone is produced.

The average sapphire boule is about 200 carats. When this boule is taken from the furnace it is whole, but when the elongated tip of the radish-shaped crystal is broken off, the boule splits into two halves. The halves are then made into either jewelry or bearings.

Before World War II no synthetic stones were manufactured in the United States. The war caused the end of shipments to this country. Thus the synthetic sapphire industry, like the synthetic rubber industry, grew because necessity demanded. At the end of the war, the production of synthetic stones in this country had reached a high of 20,000,000 carats of rubies and 12,000,000 carets of sapphires per year.

Although natural rubies are worth $50 to $2000 per carat when cut, synthetic rubies of comparable quality can be obtained for as little as five cents per carat, uncut.

The American jewel industry feared

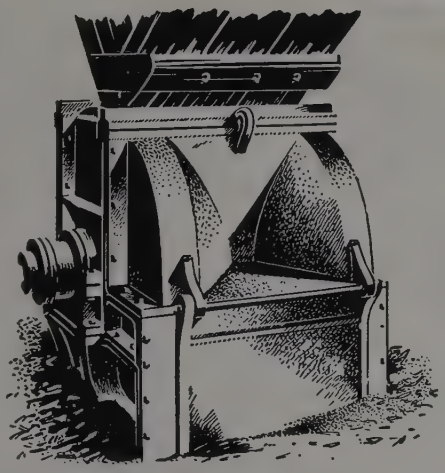
Star rubies—natural on left, synthetic on right. (Courtesy of Fortune).

that it would die when the end of the war renewed European trade. European bearings cost, at that time, about one-fourth what a domestic bearing did. By the end of the war, however, our production methods improved greatly, and inflation hit Europe. Today European firms are having a hard time competing with American firms. The most important of the companies is Linde Air Products Company, a subsidiary of Union Carbide and Carbide Corporation. Linde has developed mass production methods for producing jewel bearings.

Industrial use of the sapphire depends on its hardness. On the Mohs scale,

(*Continued on page* 24)

Another page for **YOUR BEARING NOTEBOOK**

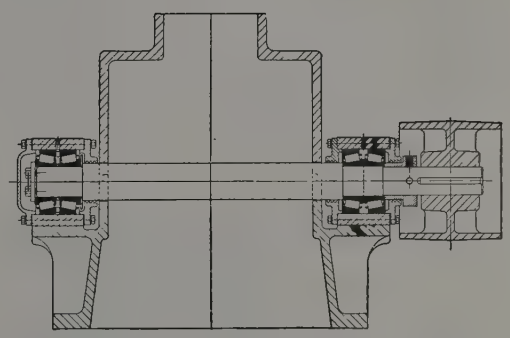


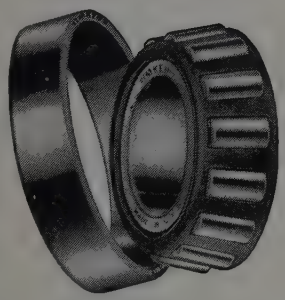
How to improve a wood hog's appetite

The wood hog shown here chews up logs for paper pulp like a giant pencil sharpener. As they chip away at the logs, the revolving cutter knives impose heavy shock loads on the bearings. To carry these shock loads, engineers specified that the cutter shaft be mounted on Timken® tapered roller bearings. Due to the line contact between the rolls and races, Timken bearings have extra load carrying capacity —take the heaviest shock loads.

Here's how engineers use TIMKEN® bearings for heavy shock loads

To give extra support to the wood hog's main shaft, double-row Timken bearings are used. The tapered construction of the rolls and races enables Timken bearings to carry both radial and thrust loads in any combination. Shafts are held in rigid alignment, end movement eliminated. Because Timken bearings permit the use of effective closures, lubricant stays in and dirt and moisture are kept out.





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NOT JUST A BALL ○ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ⬭ AND THRUST ⬭ LOADS OR ANY COMBINATION ✳

FROSTED CRYSTALS . . .

(*Continued from page 22*)

which rates the diamond at 10.0, the sapphire is given the second highest rating, 9.3. One use of synthetic jewels in industry is jewel bearings. During the last war, a battleship used over 5,000 jewel bearings. The instrument panel of a bomber needed one hundred. Beside the well-known jewel bearings in watches, and other time pieces, synthetic sapphires keep many other fine instruments accurate. Electrical meters and many other instruments of measurement and control depend upon jewel bearings for accuracy.

Sapphires and rubies have long been known as beautiful gems. The most valuable ruby is a deep blue-red, pigeon's blood, but the ruby exhibits every shade between this and the pink sapphire. Sapphires are white, pink, purple, green, yellow, or tangerine, and, most valued of all, a velvety, cornflower blue. Much of the value of a stone as a gem depends upon the way it has been cut. In identical settings, a well-cut synthetic gem will demand only one-eighth the price a natural stone will bring. As far as beauty and wearing ability are concerned, the synthetic is equal to the natural stone.

The most valuable member of the sapphire family, the star stone, has also been produced. A star sapphire, or ruby, when held at a certain angle to light rays, shows a bright, perfectly-formed star. The star consists of six rays originating at a point in the center of the stone. Those rays make 60 degree angles with each other.

Linde Air Products Company has discovered the secret of the star stone and has produced them on a small scale. The star in a Linde stone is often more brilliant than that of a natural one, but the brighter star commands a higher price. A ring with an average size natural star ruby in a plain setting is valued at approximately $6000. A synthetic star of the same size will cost only $700 in a diamond setting. This is a wonderful opportunity for the women. A ring which only a laboratory technician can tell from a real stone is now within the price range of many more husbands. The market will not be flooded with star stones as it was with reconstructed rubies, because the Linde process is a closely-guarded secret, and the gems are not capable of being mass-produced.

The alchemist of old was continually trying to transform an inexpensive substance into one of great value, usually a base metal into gold. He was never successful, but modern chemists have succeeded in transforming cheap aluminum oxide into valuable rubies and sapphires.

Then there was the man who took out fire insurance because he thought he was going to die.

* * *

She was the type of a girl who rode home from a walk.

* * *

A skeptical tourist was introduced to an old Indian claimed to have a perfect memory. She asked, "What did you have for breakfast on March 20th, 1910?"

Grunted the Indian, "Eggs."

Ten years later, as the same tourist passed through that territory, she stopped wondering if the old Indian still remembered her. She found him in the exact same spot and greeted him with a customary, "How?"

Came the reply, "Scrambled."

* * *

A senior engineer dated a blonde coed with some interesting sine curves one evening. After that first date, when he didn't call her up anymore, she sent him a telegram worded, "Dead, delayed, or disinterested?"

Came back an answering telegram, "Hunting, fishing, or trapping?"

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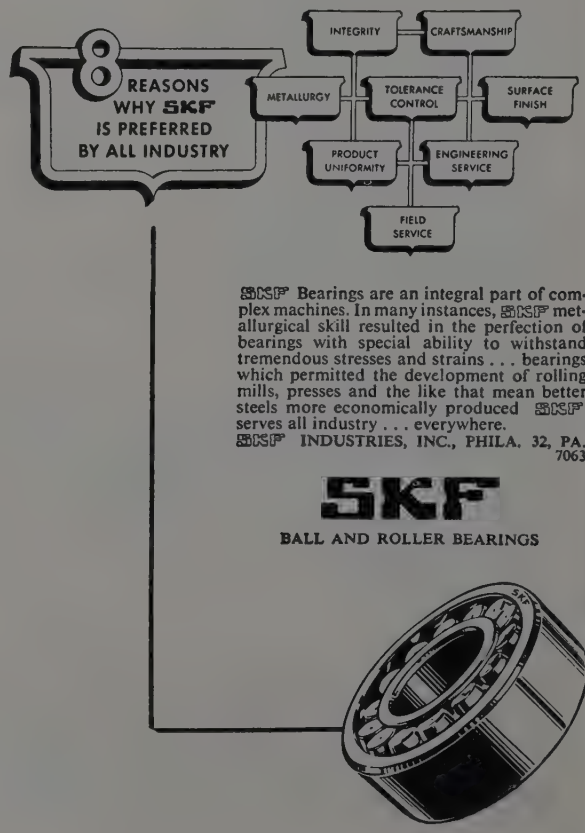

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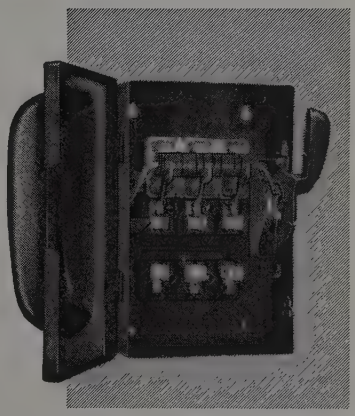

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HONORARIES . . .

(*Continued from page* 14)

were as follows: Donald Anderson; William Bristow, Jr.; Glenn Gareiss; Nicholas Iosue, Gordon Nelson, Roy Peterson, Jr., Harold Stillman, Charles Swenson, Frank Andrejasich, James Asbury, Donald Bradfisch, Ralph Dix, Donald Reilly, Carl Falkenstrom, Edward Finkel, Jack Finley, Edward Greifzu, Ralph Hahn, Dean Merchant, John Jessen, Stephen Kostecke, Peter Kuhns, August Liesse, Harlan Lillie, John Marks, Consuelo Minnich, Robert Mitchell, William Stief, Jerry Patterson, Sol Sassoon, Donald Schnepper, Paul Shuldiner, Edward Streed, Raymond Vertovec, and Richard Warnock.

AFS

Last May 15 marked the end of activities for the American Foundry Society when they headed away from books and theory to see how classroom knowledge was applied in modern industry on a field trip to the Caterpillar Tractor Co. This day then wound up with a district meeting with the Central Illinois AFS Chapter meeting.

The men steering organizational activities for the coming fall semester will by Jim Garman as chairman; Burton Amos, vice chairman; Dale Besterfield, corresponding secretary; Jack Rice, recording secretary; Bill Ellenberger, treasurer; David Day, assistant treasurer; and Fred Rohr and Paul Smith as Engineering Council representatives.

A hurried look at the list of coming events shows that AFS has arranged an interesting schedule for this year. One will be a General Motors demonstration, "Core Sand, Before and After," and talks will be given by Mr. Frank W. Shipley, foundry manager of Caterpillar Tractor Co., and Mr. Dreher, national director of the Foundry Educational Foundation.

MU SAN

Mu San, one of the oldest honorary engineering fraternities on the campus draws its membership from outstanding students in the field of sanitary engineering.

The last meeting of the spring semester, held on May 23, was highlighted by the father-son initiation of Mr. George Russell, consulting engineer of St. Louis, Mo., and his son, George Russell, who is in graduate work in sanitary engineering here at the University.

Following the initiation, a banquet was held at the University Club for members and their wives and friends. Mr. Russell gave a short account of his famed Daytona Beach process for sewage disposal and conducted a short discussion on this subject after the dinner.

Officers for the past semester were: Jack McLean, president; Frank Blake, vice-president; and Bill Morse, secretary-treasurer.

ETA KAPPA NU

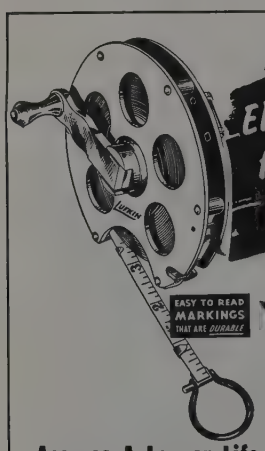
Eta Kappa Nu, electrical engineering honorary, presented Mr. Irwin A. Cochrun of the Cochrun Studebaker Sales of Champaign, lecturer in marketing, at the last coffee hour of the semester. This meeting and similar coffee hours have been sponsored in hours have been sponsored in the past by the joint efforts of Eta Kappa Nu and AIEE-IRE.

Mr. Cochrun spoke on "Selling by Engineers." He pointed out the advantages of this field and predicted that many engineers will enter it.

Dyna: "How'd you learn to swim?"
Mo: "I had a job as street cleaner in Venice."

* * *

That's all. *Pax Vobiscum.* May you roast in peace. We will now get back to the normal of engineering jokes.



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Aluminum melts at 1217° F....

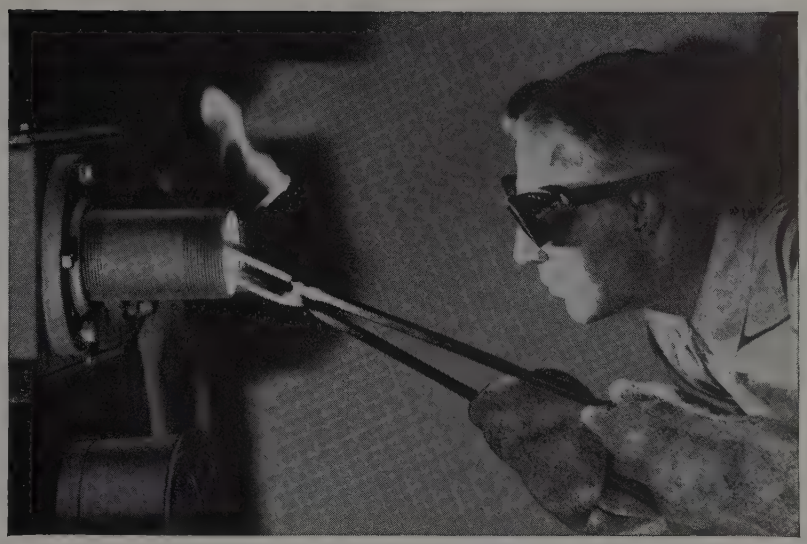
What's the melting point of fused aluminum oxide?

- ☐ *1652°F.*
- ☐ *2732°F.*
- ☐ *3272°F.*
- ☐ *3722°F.*

Not 1652°F. which is a bright red heat; nor 2732°F. which is white heat; nor 3272°F., the highest temperature in a blast furnace.

Yes, the melting point of fused aluminum oxide (as made by Norton from the mineral bauxite under the registered trade-mark Alundum) is 3722°F. That's why it's such a popular refractory material. Because it also possesses high thermal conductivity and low electrical conductivity when hot, it is used extensively in both fuel and electrically heated furnaces.

In the Norton Mechanical Laboratory, W. M. Wheildon, Jr., B. S. and M. S., Massachusetts Institute of Technology '30 and '31, takes readings on a wear-testing machine which he developed.



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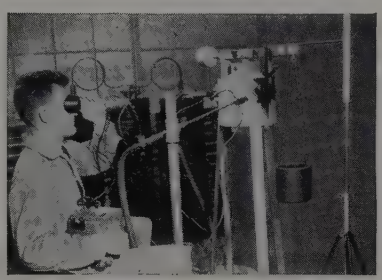
Alundum grains in various crystalline structures are widely used as abrasives. On the Knoop scale, they have a hardness of 2000, the same as the sapphire.

As the world's largest manufacturer of abrasives, Norton has worked wonders with Alundum grains. Highly skilled, college-trained research men in Norton's laboratories have succeeded in giving to Alundum abrasives a wide range of physical properties by controlling the size of crystals and their chemical and physical properties.



In the Norton Ceramic Laboratory O.J. Whittemore, Jr., B. S., Iowa State '40, operates a load test furnace of his design — a furnace that tests refractories at temperatures up to 2450°C.

32 Alundum Abrasive

The crowning achievement in aluminum oxide chemistry was the creation by Norton of a unique single-crystal grain structure of unusual sharpness. Named "32 Alundum," it has been hailed as the "greatest abrasive contribution to increased grinding production in more than 40 years."

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There is a bright future in the abrasive industry for young engineers whose talents run in that direction. Remember that Norton is dedicated to "making better products to make other products better."

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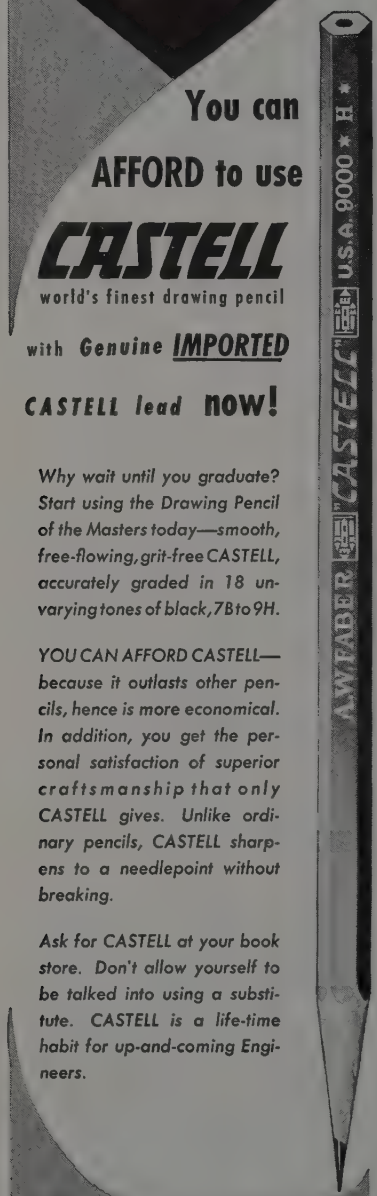

BILGE . . .

(*Continued from page* 16)

minutes to travel across the earth's orbit and thereby arrived at the velocity reported. Though their figure was a bit high, it certainly speaks well for their ingenious thinking and crude methods."

* * *

FLUSH THE BONEYARD

* * *

Question Mark?

"Dear Editor,

"I am very happy to hear that you are staying calm, cool, and collecting this summer. Or rather, cool. The weather is gorjus here, I think. . . .

". . . Are you in need of something to fill up space in the *Bilge?* Naturally, my self-esteem urges me to contribute, but it is a bit difficult to editorialize facetiously on the spur of the moment. I shall try a 100 words shortly, but they may not arrive on time. Do not hesitate to cast out my offering if it doesn't move you or if space is cramped . . ."

(Editor's Note: The above gentleman, employed in the Fairbanks-Morse electrical department drafting room, had a good bit to do during the summer, and the promised 100 words never came however, since at the beginning of this column, we guaranteed staff contributions, this couldn't be overlooked).

* * *

FLUSH THE BONEYARD

* * *

FOR FRESHMEN ONLY

"When I was a freshman, more than one question popped into my mind about some of the lingo and lore of engineers around this University. I, therefore, will offer some definitions:

U. of I. Engineer—Although Webster failed to include this definition in his famous pile of paper, he might be forgiven since the University was founded a short time after his death. The best definition to date is: 'A man of Einsteinian and Samsonian proportions girded with a slide rule.'

North Campus—University reference to Engineering Campus which, as the logical name implies, is concentrated on the north of Green Street. South Campus—well . . .

Slide Rule — (synonyms: sly drool, slip stick, etc.). An instrument for shortening engineering calculations. Every well-dressed engineer wears one by his junior year. Although very convenient for exams, homework, design papers and other such trivia, its greatest use comes as a back-scratcher, nail hammer, straight-edge, paddle for erring pledges, etc.

The Boneyard—Local residents call it various things: "sewer," "creek," "river," "stream," etc. The engineering vocabulary calls it "a walking mud-puddle, which is, was, and will be forever more polluted." In the first few months one becomes acquainted with this stream, crossing its banks causes hair-raising, eye-bulging, choking and extreme fits of nausea. Have no cause for alarm, for within two months, you too will develop a Nose that will henceforth sniff out the sweeter smells of the infamous creek from the coarser odors of dead cats, sewage, rotten food, embalming fluid, slime, and lye.

St. Pat—The first and greatest of all engineers whose engineering feats were and still are the most miraculous ever known. In nearly every engineering college throughout the United States, the student bodies have adopted him for their Patron Saint and hold annual celebrations in his honor. The St. Pat's Weekend at Illinois is one of the big social events of the year.

Key Chain—In due course of events, the average engineer becomes affiliated with a number of engineering societies, both honorary and professional. The emblem of these societies, one attaches to a key chain hanging from his belt. The more important the individual, the more stoop-shouldered his appearance from carrying this load.

BMOC—(Synonym: wheel), abbreviated form of Big Man on Campus, i.e., one whose word carries weight . . ."

Lostmateethius: "A woman threw stones at our emperor."

Whattadaytus: "Caesar?"

Lostmateethius: "We tried to, but she got away."

* * *

Mo: "Are you going to roam?"

Tor: "No, I'm going to Athens."

* * *

Two small babies were sitting in their respective coaches outside a grocery store. Said one to the other: "I'm a little dirl. What are you?"

The other said: "Well, I'm not sure. I think I'm a little boy. Wait and I'll see."

The infant lifted up his dress, pointed and said: "Yep. I'm a little boy. Look! I got blue booties on."

* * *

A pair of Scotties can carry on a two-wag conversation.

* * *

The young engineer came home from the office to find his wife highly agitated.

"What's the matter, Dear?" he tenderly inquired.

"Oh, I've had a terrible day," she replied. "Baby cut his first tooth and then he fell and knocked it out!"

"Well, and then what happened?"

"Oh, darling," she answered in a shocked voice, "he said his first word!"

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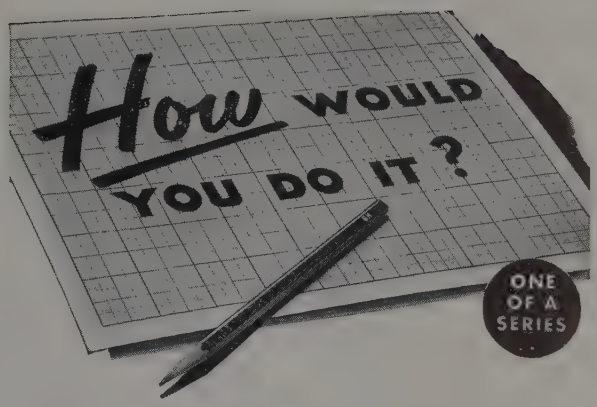

PROBLEM—You are designing a cabinet-type oil heater. The oil and air metering valve has to be placed at the bottom. You now want to provide a manual control for the valve located on the cabinet front where it is easy to see and to operate. How would you do it?

THE SIMPLE ANSWER—Use an S.S.White remote control flexible shaft to connect the dial to the valve or to a rod running to the valve. The latter method was used in the heater illustrated below. The flexible shaft will provide smooth, sensitive control and will allow you to put the dial anywhere you want it.

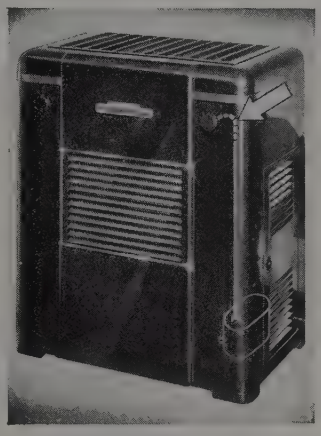

Photo courtesy of Quaker Mfg. Co., Chicago, Ill.

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HAYMAKING . . .

(*Continued from page* 10)

without sacrificing ability to safely cure a specified amount of hay.

Most barn hay-curing systems consist of three main elements—a blower to force air through the system, a main duct to carry the air to the laterals, and lateral ducts for distributing the air evenly over the mow floor. The main duct may either extend down the center of the mow or be located along the side. A central duct affords better distribution of air for the laterals are shorter, but its location is undesirable when the mow is empty. The side main duct has the advantages of being out of the way and being large enough to enter for lateral opening adjustments. A system for narrow barns of less than 20-foot width may consist of only a central duct with no laterals.

A few systems have a false, slatted floor replacing the main and lateral ducts. This design has proved unsatisfactory due to its horizontal air openings. Hay, especially that that is chopped, packs in the openings and tends to fill in the space under the false floor, thereby disrupting the even distribution of air. Such a design requires that the flase floor be made in sections for easy removal to facilitate cleaning under it.

The entire design necessarily depends on the volume of air to be forced through the hay. Of course, the greater the quantity of air circulated the more moisture it will take up, thereby drying the hay faster, but economy and power requirements are limiting factors. Usually the amount of air to circulate is determined by providing for 15 cu. ft. per minute per sq. ft. of mow area. This volume may be increased by a third under conditions where quick drying is the only criteria of design. Fast curing decreases danger of mold growth and heating.

The size of the main duct is determined by allowing an air velocity of 1,000 ft. per minute in a large side duct and not more than 1,500 ft. per minute in a central duct. This higher velocity is used to decrease the size of the central duct. Where practical, the larger main duct with a resulting slower air movement is desired.

An air velocity of 1,500 ft. per minute determines the size of the laterals. They are spaced four to five ft. on center, depending on how the mow length divides; the narrower spacing is preferred. The side laterals should be about 5 ft. from the edge of the mow; the ends of the laterals must extend to within 6 ft. of the side of the mow. If the main duct is over 16 in. wide, air outlets should be provided on the top by using top ducts of the same size as the laterals. The air openings should have a cross sectional area equal to that of the top duct. Top ducts should start at a point 3 ft. from the fan and extend on top of the main duct as long as it is over 16 in. wide.

The slatted floor system is of standard design being constructed of 2x6 material 2 ft. apart and covered with 1x4 strips 1 in. apart. This false floor extends to within 5 ft. of all walls.

Main ducts are constructed air-tight of matched tongue-and-groove lumber with 2x4 framing. The framing is put on the outside of the ducts so that it will not disrupt the air flow. Theoretically, the ducts should be tapered, but, for ease of construction, they are usually made uniform in size for their entire length.

In contrast, the laterals need not be of air-tight construction for they have no bottoms and are held off the floor 4 in. by blocks under the edges. Needless to say, the mow floor must be air-tight in all cases so that the air is forced up through the hay and not out through openings in the floor.

At the inlet end of the main duct an enclosure is usually constructed for the motor and fan. It must be constructed so that air coming to the fan is from outdoors and is not air that has already become moisture-laden from passing

(*Continued on page* 32)

NO SLIDE RULE NEEDED to figure the advantage of---

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NO

Additional charge for deposits or checks
Minimum balance required
Pass book to bother with

We designed this economical checking service for YOU. Simply buy a book of 20 ILLINICHECKS for one dollar and use these checks as long as you have a balance in your account.

WHY CARRY CASH — CARRY A BOOK OF ILLINICHECKS

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ARLAN McPHERSON, Assistant Cashier

Product
..FOR BETTER LIVING

ALCOA
FIRST IN
ALUMINUM
The light metal that lasts

A BETTER KIND OF SCREENING *made of Alcoa Alclad Aluminum. Each wire is a strong alloy core combined with a highly corrosion-resistant outer layer. Result: a* lasting *screening, that* will not weather-stain sills or siding. *Cost: no higher than you're used to paying for good screening. Worth asking for, to install in your present frames, or in new aluminum-framed combination screen and storm windows.*

Story
BEHIND THE PRODUCT

DISCOVERY WHILE SHAVING. To a certain Alcoa metallurgist, the past few weeks' research seemed futile indeed as he faced his mirror one morning in the late twenties. This problem was a sticker: Army and Navy planes demanded a new kind of aluminum; just as strong, but far more impervious to salt spray and weather . . . Suddenly, as he squeezed the last bit of shaving cream from the tube, a message flashed. He wrapped the empty tube around his finger. Yes . . . a core of strong aircraft alloy . . . like this. An outer layer of pure, highly corrosion-resistant aluminum . . . like this!

Hastening to the laboratory, he tried out his new idea. It worked! Tests proved it to be everything he hoped it would be. Then he collared the boss roller in Alcoa's sheet mill. Quickly, he explained how this new, more useful form of aluminum was to be made. "Can you roll it, Dan?" the metallurgist asked anxiously.

"Sure we can roll it!" grinned the big, capable man in overalls. Soon a sheet ingot of high-strength alloy, sandwiched between two thinner slabs of almost pure aluminum, was slamming through the shining rolls. It grew wider, thinner at every pass—a sandwich, welded by the tons of pressure into a single unit. Finally, there emerged a new, protected kind of aluminum sheet. We called it "Alclad" Aluminum. And it came to be a mighty factor in America's air power. Most military and civil planes wear this strong shining skin.

We learned to make it into rods and tubing, even to draw it into fine wire. And thus, among many other things, a better kind of screening was born.

Moral
FOR THINKING PEOPLE

BECAUSE FREE COMPETITION *demands constant improvement, Alcoa stockholders backed this metallurgist and his fellow researchers, until their perseverance found the answer. Others stood ready, in plants, sales offices and management, to introduce the new Alclad products. After 18 years, this better product is still creating new jobs, and helping America toward better living, in home, farm, and industry. Seems like a good system for all concerned.* ALUMINUM COMPANY OF AMERICA, *742 Gulf Building, Pittsburgh 19, Pa.*

ALCOA
ALUMINUM

HAYMAKING . . .

(*Continued from page* 30)

through the hay. The inlet to the fan should, of course, be screened. Adequate openings must be provided above the hay for the free circulation of air.

The fan itself may be either the centrifugal or the prop type.: The prop type is simple and inexpensive but makes excessive noise. Either the backward or forward curved blades of the centrifugal type may be used. The backward curved type is the more expensive of the two, but it has the advantage of not overloading. The forward curve type requires more power if the pressure drops off. The size of the fan necessary to deliver the required volume of air may be determined from published tables.

The power for the fan is sometimes supplied by a tractor, but more often an electric motor is used. Most rural lines limit the size of the electric motor to 5 hp.

Contrary to popular belief, hay cannot be taken to the barn for curing immediately after it is cut. Hay that is to be dried loose (not chopped or baled) must be allowed to cure in the field until it reaches 45 per cent moisture. An additional 10 per cent moisture content must be lost in the field if the hay is to be chopped or baled. (New-mown hay contains 60 to 70 per cent moisture). However, during good drying weather the hay may be cut in the morning and stored late that afternoon though it is usually left in the field overnight.

Only a certain amount of hay can safely be cured at one time, so limits are set as to the depth of the hay in the mow. An 8 ft. layer of long hay may be mow-cured at one time with more added at intervals until a total depth of 18 ft. is reached. Similar limits for chopped hay are 6 ft. and 12 ft. The maximum layer and total depth for baled hay is seven bales laid flat.

As soon as the hay is put in the barn the fan is started and should be run continuously until most of the moisture is removed. Then only daytime operation should be maintained until the drying is finished. The top layer of hay dries last so it is used to test for dryness. When the hay seems to be cured the fan is stopped and the mow is checked for accumulation of warm air. If the hay is not thoroughly cured it will start to heat and the fan should be operated some more. Uncured spots may be present in the hay so the mow should be checked several times before the fan is turned off for good. The fan is not run on rainy or foggy days unless the hay is fairly damp and needs the air circulation to prevent heating. In most cases, however, the drying will be practically completed in seven days.

Though the present barn hay-curing systems do a fine job of curing when constructed and operated properly they are limited in their acceptance by their cost and low capacity. Most present-day mows are 20 to 40 ft. in depth so hay cannot be barn cured without a considerable waste of overhead space. If a system were devised for proper curing of hay with a 30 ft. depth without an excessive consumption of power it would be a great step forward in the development of the farm industry.

A little five-year-old girl dressed up in her mother's clothes and firmly holding the chubby hand of her toddling brother appeared at a neighbor's doorstep and said formally, "I am Mrs. Smith, and this is Mr. Smith. We've come to call."

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Quick-freezing Corn-on-the-Cob with Frick Refrigeration

The Frick-Freezer Operates at 30 Deg. Below Zero

The W. E. Bittinger Co. freezes cut sweet corn and corn-on-the-cob, as well as spinach, at its new plant in Hanover, Penna. Its Frick-Freezer handles 30,000 pounds of corn a day; its storages hold 400,000 pounds.

Another example of the effectiveness of Frick low-temperature refrigeration — used also in the world's largest quick-freezing plant.

The Frick Graduate Training Course in Refrigeration and Air Conditioning, operated over 30 years, offers a career in a growing industry.

Four Frick Compressors at Hanover

DEPENDABLE REFRIGERATION SINCE 1882
FRICK CO.
WAYNESBORO, PENNA. U.S.A.
Also Builders of Power Farming and Sawmill Machinery

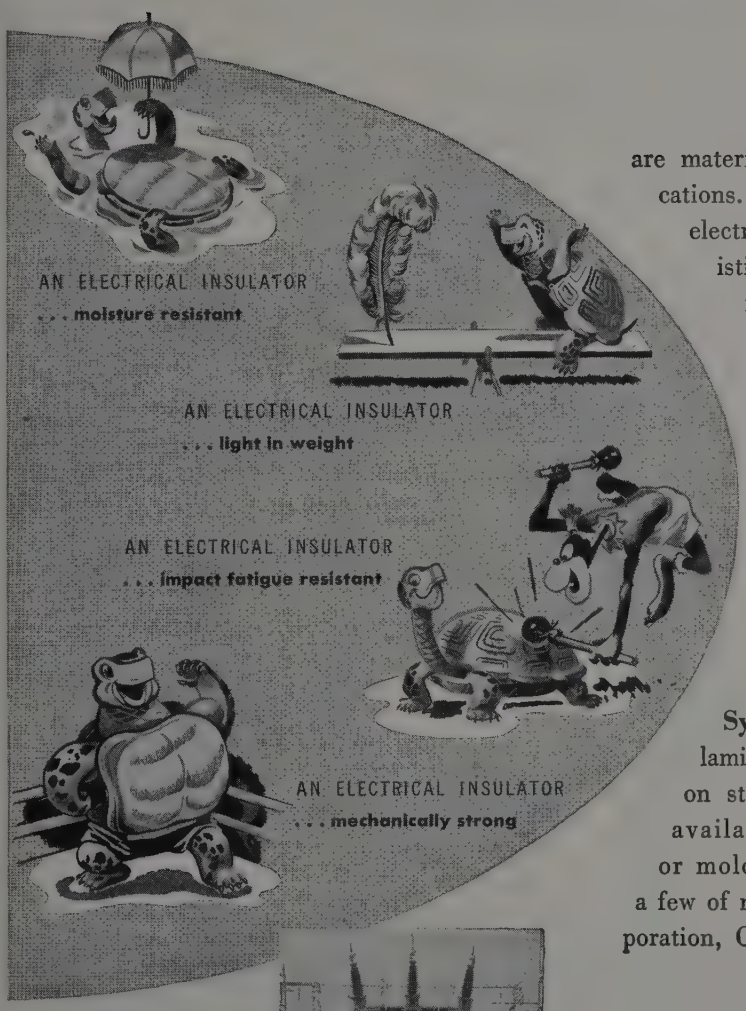
MILLING CUTTERS — many styles and sizes

Efficient milling on a wide variety of work and materials is made possible by the broad range of styles and sizes offered in this complete line of cutters. Brown & Sharpe Mfg. Co., Providence 1, Rhode Island.

BROWN & SHARPE B·S

It's an electrical Insulator

It's a new idea Stimulator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AN ELECTRICAL INSULATOR
. . . mechanically strong

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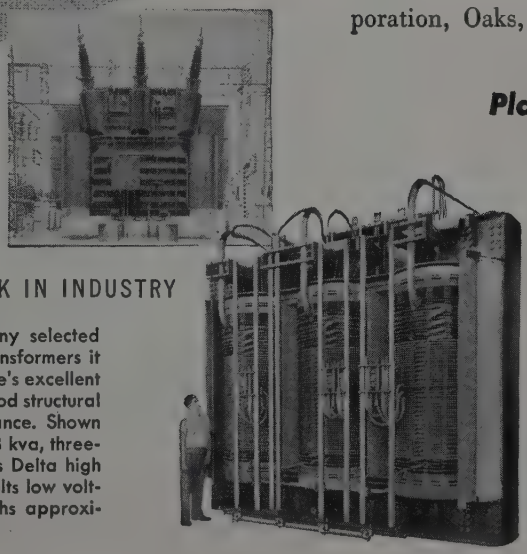
Synthane is an excellent electrical insulator. Synthane is high in dielectric strength, low in dielectric constant and power factor. It is also light in weight, hard, dense, strong, resistant to abrasion, corrosion and moisture, and is dimensionally stable.

Synthane speeds fabrication. Synthane laminated can be machined quickly and easily on standard production equipment. It is also available in a variety of molded-laminated or molded-macerated shapes. These are only a few of many Synthane advantages. Synthane Corporation, Oaks, Pennsylvania.

Plastics where plastics belong

SYNTHANE

where Synthane belongs



SYNTHANE AT WORK IN INDUSTRY

The Moloney Electric Company selected Synthane for parts of the transformers it produces, because of Synthane's excellent electrical insulating ability, good structural strength and corrosion resistance. Shown at right is the Moloney 33,333 kva, three-phase, 60 cycle 132000 volts Delta high voltage to 34500Y/19920 volts low voltage. The complete unit weighs approximately 227,000 pounds.

DESIGN • MATERIALS • FABRICATION • SHEETS • RODS • TUBES • MOLDED-MACERATED • MOLDED-LAMINATED

HAYMAKING . . .

(*Continued from page* 30)

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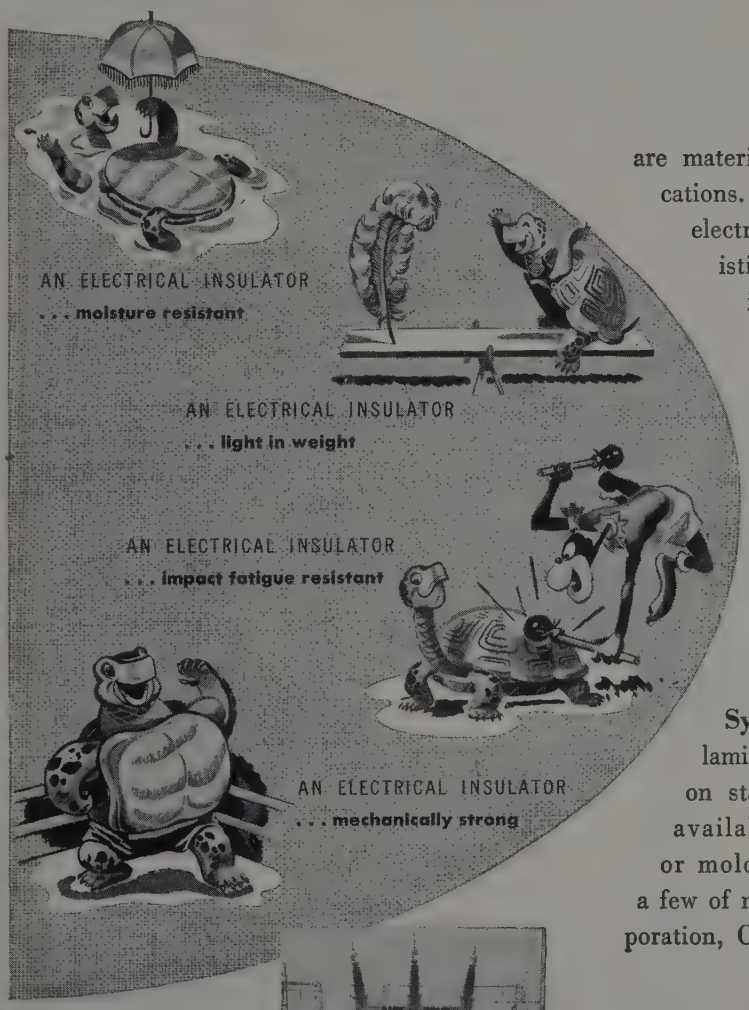
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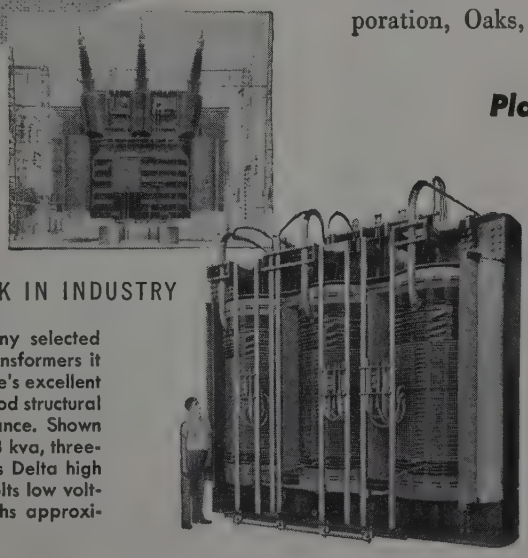

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INTRODUCING . . .

(*Continued from page* 12)

dent of the Engineering Council. He has also served as chairman of the arrangements committee at Wesley Foundation. Last June he received a reserve commission as a second lieutenant in the Coast Artillery. Previous to that time he was a cadet major in the advanced ROTC and was a member of the Military Council. Errol is also a member of Tau Beta Pi, Sigma Tau, Alpha Zeta, and Phi Eta Sigma. Still not satisfied, he took it upon himself to organize and become the first president of the V. K. Club, an independent house.

ERROL D. RODDA

Perhaps the most amazing fact is that Errol Rodda's scholastic average is 4.79! Instead of these activities hurting his average, he claims that they have forced him to work more efficiently.

In view of his work, Errol has received the following awards: the United States Coast Artillery Medal as the "outstanding advanced Corps cadet"; the MIA Scholarship Trophy as the "outstanding upperclassman scholastically"; the Ray T. Nicholas Scholarship as the "outstanding senior in agricultural engineering"; the University of Illinois Scholarship Key; Knight of the Order of St. Pat, for his activities and contributions to the promotion of engineering interests on the campus.

After graduation, Errol is still undecided whether to do graduate work, or to begin work in agricultural construction. Whichever he chooses, the indications are that he will be successful.

NEW DEVELOPMENTS . . .

(*Continued from page* 2)

Television in Brazil

Television arrived in Brazil when the country's largest network, the Emissions Associadas, began its station operation late last summer, according to *Radio Age*.

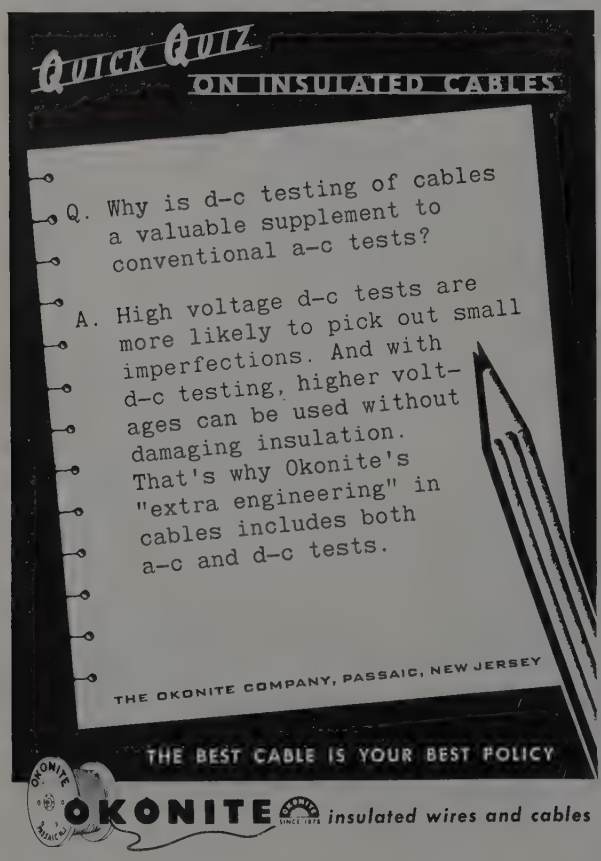
The main installation on top of the State Bank Building in Sao Paulo is a three-bay, super-turnstile antenna and transmitter. Studio equipment, outdoor mobile units and the main transmitter came from RCA, as well as the microwave transmitting set-up for overall connections. The new station went on a 60-66 megacycle operation, the equivalent of the United States channel 3.

Designed for Trouble

Weston Electrical Instrument Company has produced a power unit that satisfies even the stiff requirements of the Fire Underwriters' Laboratories. The new Type E. Tachometer generator will remain in place despite danger from vapor or dust grain explosions.

The sturdy hide that offers this protection is a cast iron housing. Available for both AC and DC connections, the new generator makes a good installation

(*Continued on page* 38)


QUICK QUIZ
ON INSULATED CABLES
Q. Why is d-c testing of cables a valuable supplement to conventional a-c tests?
A. High voltage d-c tests are more likely to pick out small imperfections. And with d-c testing, higher voltages can be used without damaging insulation. That's why Okonite's "extra engineering" in cables includes both a-c and d-c tests.
THE OKONITE COMPANY, PASSAIC, NEW JERSEY
THE BEST CABLE IS YOUR BEST POLICY
OKONITE
insulated wires and cables

Engineering Students

You will find at the Co-Op Bookstore your needs in engineering and art supplies, stationery, textbooks, and general reading.

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The Bookstore Closest to Engineering Campus
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BOTTLENECKS

Have No Place in Production—or in Your Future Progress!

by CHESTER E. MEYER
Superintendent, Production Scheduling
General Machinery Division
ALLIS-CHALMERS MANUFACTURING COMPANY
(*Graduate Training Course 1938*)

PRODUCTION CONTROL in a big plant like the Allis-Chalmers West Allis Works is a constant campaign to prevent bottlenecks and keep orders moving along smoothly to meet scheduled shipping dates.

CHESTER E. MEYER

Most men face much the same kind of personal problem when they get out of engineering school and plan a program of graduate training and experience leading to a firm position in the work they want to do. They can't afford to risk bottlenecks and blind alleys in that program, either.

Big Opportunity

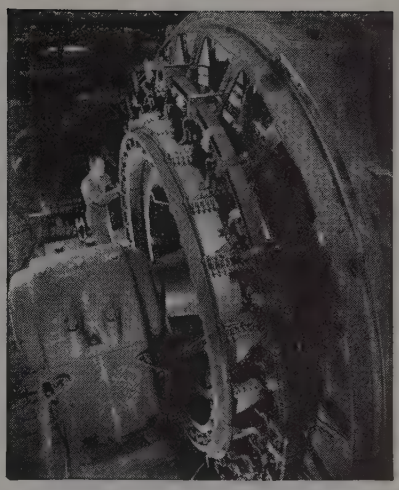
I had this in mind when I graduated from MIT in 1936 and enrolled in the Allis-Chalmers Graduate Training Course. I'd been particularly interested in production and sales. I was looking for practical training, experience and opportunity. And I got them.

First assignment was in Steam Turbine erection. Then I went to the Centrifugal Pump Department, and worked on cost analysis. This job gave me a chance to study plant layout and manufacturing methods, and put me in contact with the Time Study and Planning Department. I liked the work, and finished up the course in that department. I've stayed in the same type of work ever since.

Here in Production Scheduling we pick up each job after the Planning Department has established the routing. It's up to us to set a shipping date, and then work out dates when the job is to be completed in the various shops through which it must go. This requires a thorough knowledge of methods, shop capacities and work loads throughout the entire plant.

Great Diversity of Products

To give some idea of the extent of this operation, here are a few facts about the West Allis Works: The floor area of the buildings is more than 160 acres. There are 14 miles of railway and 4 miles of roads within the plant, and the shops contain more than 30,000 power tools, from small precision machines to the great 40-foot boring mill. It requires 208 traveling cranes to handle materials and equipment. There are twelve great machine, assembly and erection shops, three foundries, pattern shop, tank and plate shop, forge shop, mill shop and many miscellaneous buildings used in manufacturing.



Assembling big direct-current blooming mill motor for test—last step in the manufacturing process before shipment and final installation.

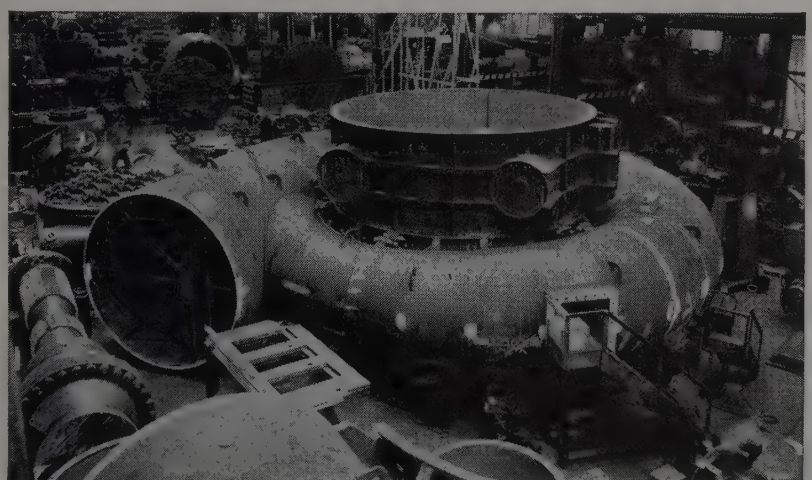
Some of the big jobs going through now include a 107,000 kw steam turbine unit for a midwest utility and two complete new hydraulic turbine and generator units for Hoover Dam. There's an order for six 22,000 hp pumping motors for a West Coast irrigation project, and another for one of the largest power transformers ever built. Rotary kilns up to 400 ft. in length, gyratory crushers weighing 500 tons and 22 million volt Betatrons are all products of these shops. So are delicate electronic and control devices.

Allis-Chalmers designs and builds basic machines for every major industry: steam and hydraulic turbine generators, transformers and other equipment for the electric power industries; crushers, grinding mills, rotary kilns, screens and other machines for mining, ore processing, cement and rock products; flour mills and oil extraction plants; electronic equipment; big pumps, motors, drives . . . to name just a few.

Widest Choice

As you can see, Graduate Training Course engineers at A-C can move in just about any direction they choose—any industry, any type of work from machine design, research and product engineering to manufacturing, selling and installation.

The course is set up to allow students plenty of chance to gain training and experience in the work they choose. There's no reason to run into bottlenecks or dead-end streets—for students help plan their own courses, and are free to change their plans as new interests, new opportunities, present themselves.



Completed parts flow on a planned master schedule from all parts of the great West Allis Works as this large turbine unit takes form. This is a general view of a part of the vast erection shop.

ALLIS-CHALMERS

Allis-Chalmers Manufacturing Company, Milwaukee 1, Wisconsin

NAUTICAL INSTRUMENTS . . .

(*Continued from page* 9)

bottom of the ocean and back to the ship. Since sound travels at a uniform rate under water, the time interval is an indication of the depth of the water.

Radar experiments were started about 1930 at the Naval Research Laboratory, and the first shipboard system was installed in 1938 aboard the U. S. S. "New York." Loran, another wartime development for guiding planes and ships, is similar to radar in its technique, but differs in having the transmitter at fixed points along coastlines or islands, with the receivers only in the planes or ships.

Loran is the latest development in navigation, but who knows what is to come, for the future holds many possibilities. However, in spite of all these aids, navigation is still an art, and the navigator needs good judgment as much as he needs good instruments, if he expects to make port safely.

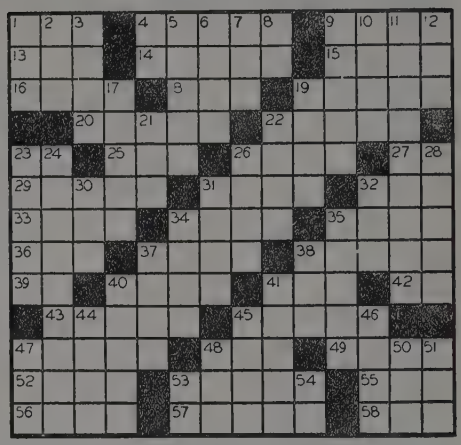
Sweet young thing: "Don't you love a night like this?"

Wolf: "Sure. Wait'll we get farther out in the country."

* * *

Short, short story: "From bar to car to gates ajar."

Crossword Puzzle



ACROSS

1. Electric cell having liquid in it, is called ——
4. Consumers
9. He built an electric locomotive in 1883
13. Epoch
14. Frenchman who developed a commutator for generators in 1832
15. Tract
16. First man to make a telephone call, 1876
18. Kind of light one should not read by
19. Popular place to wear a watch
20. Mark of insertion
22. Tall bamboo-like grasses
23. The present era: abbr.
25. Word of assent
26. Meander
27. Plural ending of some words
29. Unclothed
31. Steam engine inventor, who died in 1819
32. Busy insect
33. Above
34. Trigonometric function
35. Dog's name
36. Snug retreat
37. Fatigue
38. Burdened
39. Half an em
40. Wise man
41. The one I hope this puzzle pleases
42. Compass point: abbr.
43. He discovered secondary X-ray radiation in 1896
45. He exhibited a vacuum tube 186 feet long
47. Subject of a discussion
48. Greek letter
49. Electricity helps make housework ——
52. Easily magnetized metal
53. Folds of flesh under the jaw
55. Regret
56. Sicilian volcano
57. Shelf of rock
58. Seine

DOWN

1. Spider trap
2. Before
3. Soapstone
4. To a higher level
5. Takes the part of
6. Place of egress
7. Edge
8. Note of the scale
9. Challenged
10. Very dry
11. Inventor of the electrolytic detector for wireless, 1902
12. Exchange for a tit
17. Stratum
19. Departed
21. Stalin's favorite color
22. Ceremony
23. Positive pole in electrolysis
24. First to produce a commercially successful electric motor
26. Become smaller
28. Patented a wireless tuning-in device in 1902
30. Understanding
31. Electrical conductor
32. Assistant
34. What neon lights are used in
35. Developed his storage battery, using openwork grids, in 1880
37. Relating to natives of Siam
38. Old card game
40. Thorn; Latin
41. Juvenile
44. Above and on
45. House servant
46. Work for
47. Support for railroad tracks
48. Article
50. Take to court
51. Still
53. Gas found in salt: chem. symbol
54. Material used in photoelectric cells: chem. symbol

LEATHER PLUS PROPER TENSION
Gives Continuous, Dependable Service
An ordinary trouser's belt is an everyday reminder of the continuous, trouble-free service leather plus proper tension can give.
Modern power transmission uses these same two ingredients in the Uni-Pull drive. Uni-Pull teams a modern flat leather belt with a tension-controlling motor base and gives today's industry a flexible, compact, long service drive . . . a drive that makes the most of the inherent power-carrying advantages of leather.
The Modern Uni-Pull Drive
UNIFORM PULL AROUND THE PULLEY
Modern Flat Leather Belt
Tension-Controlling Motor Base
UNIFORM PULL ACROSS THE PULLEY
American LEATHER BELTING Association
Headquarters for Authentic Power Transmission Data
41 PARK ROW, NEW YORK 7, NEW YORK
AL-43

Will we ever run out of gas?

RUNNING OUT of the crude oil that powers and lubricates our civilization is not an immediate danger. Scientific methods of exploration, drilling, and recovery keep pushing farther and farther into the future the day when petroleum must be supplemented by other raw materials. When that day comes, however, there is no danger that the American economy will slow down.

Standard Oil already knows how to make high-quality gasoline from coal or oil shale. The supply of these raw materials is far greater than the reserves of petroleum. It is important that the research and development work in the entire field of synthetic fuels continue so as to lower the cost and raise quality still higher.

Work with synthetic fuels is only one example of how Standard Oil plans ahead to serve its customers. By working to keep this company in the forefront of one of America's most competitive industries, our researchers and engineers are helping to keep America itself ahead and to make life better for every American.

Standard Oil Company
(INDIANA)

STANDARD

NEW DEVELOPMENTS . . .

(*Continued from page* 34)

in oil refineries, chemical plants, flour mills, coal mines, and other such locations where explosive atmospheres exist.

Pan American Highway

Tourist travel along the length as well as the breadth of the Western Hemisphere is not too many years away. Last May was the event of the formal opening of a new 2,177-mile stretch of the Pan-American Highway. Lying entirely within Mexico, the new portion consists of two sections: the Central Highway of a 1,333-mile length connects Ciudad Juarez near the Rio Grande border to Mexico City; the 844-mile Christopher Columbus Highway then connects Mexico City to the village of El Octotal on the Guatemalan border. From the "State-side," entrance to the Central Highway can be made through El Paso, Texas.

The new highway is expected to bring a large increase in tourist trade and Mexican businesses have already established numerous hotels, motor courts and service stations along its length. Tourists taking the circle journey that the new road provides in conjunction with existing routes from Laredo and Brownsville, Texas, will be able to see more of the real Mexico than travel conditions allowed before this time. The course of the Christopher Columbus, in particular, passes through some of the most scenic portions of jungle in Middle America, as well as through many Indian towns that were in existence before the time of Cortez.

Metal "Briefs"

The following short-shorts come from the American Electroplating Society:

". . . chromium plate used on the exterior of 1949's automobiles would coat a strip three feet in width and stretching completely around the earth at the equator."

". . . Electrolytic tinplate has largely replaced hot-dip in packaging in the food-canning field. Last year it captured a large share of the market for beer containers and is now being used for 12 oz cans by the soft-drink industry . . ."

"The chrome-plated cylinder liners and the silver, lead, and indium plated bearings of our present-day aviation motors outwear the unplated liners and bearings by ten to one . . ."

Foreign-Born Turret Lathe

From Switzerland, long-noted for its precision instruments, comes a new one-spindle turret lathe. Known as the Tar 64, this product of the Tarex Company of Geneva, Switzerland, made its debut to American industry at the Chicago Trade Fair last August 7-20.

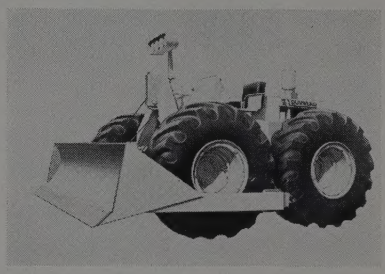
Acclaimed as a Jack-of-all-Lathes, the new machine is supposed to turn out anything from a highly-designed watch case to a pully for a V-belt drive on a bull-dozer. European manufacturers have noted it a great time-saver and low-cost instrument and have reported the following on its performance as compared to that of standard machines: it produces certain delicate typewriter parts 1-6 the usual time; it manufactures a watch case in 30 seconds or six times faster; one operator can handle three or four machines; it can produce a lens mount for a 16 mm projector in one minute.

Equipped with nine standard cams, the lathe has quite a few attachments. One of its most important features is an accelerator that reduces idle time by advancing tools into working position and thus controlling machining time at a favorable level.

New Tractor-dozer

One of the latest introductions to the construction equipment field is the new LeTourneau Model Super D Tournadozer.

Almost 3,500 *lbs* lighter and having a smaller bowl capacity than its big sister, the standard Super C, the new Tournadozer handles lighter construction jobs where speed is the main necessity. It has four speeds up to 19 mph as well as two reverse speeds. In addition to construction, it also finds wide usage as a tower on farms and in logging camps, pits, quarries, and oil fields.

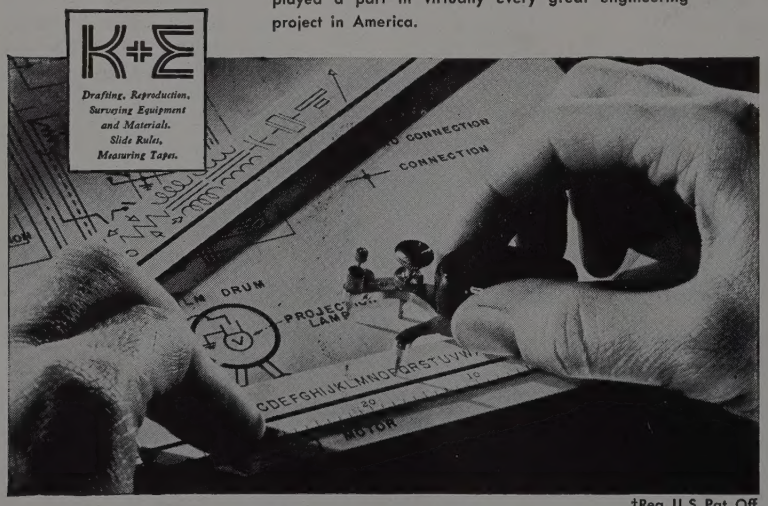


The new Tournadozer for use where speed is the main requirement.

Equipped with a bowl permitting 1.8 yards per scoop, other attachments can be made to the machine such as snow plow, root rake, side boom crane, and an overhead logging and beam winch called the Tournaskidder. Power for these operations comes from a 122 hp Diesel engine. Approximate overall dimensions are: height, 8 ft.; length, 15 ft; and width, 11 ft.

partners in creating

For 81 years, leaders of the engineering profession have made K & E products their partners in creating the technical achievements of our age. K & E instruments, drafting equipment and materials—such as the LEROY† Lettering equipment in the picture—have thus played a part in virtually every great engineering project in America.



†Reg. U.S. Pat. Off.

KEUFFEL & ESSER CO.

EST. 1867

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THE DU PONT DIGEST

Chemical Research helped produce

Better Tires For You

The tires on your car right now may have cords of Cordura* High Tenacity Rayon yarn. If so, you benefit from one of the most important contributions that Du Pont scientists have made through the years to the automotive industry.

"Cordura" High Tenacity Rayon is comparable to structural steel in tensile strength. It makes possible tires that are at once lighter, stronger and safer than pre-war tires. Unlike natural fibers, the qualities of this product of chemical science are always uniform.

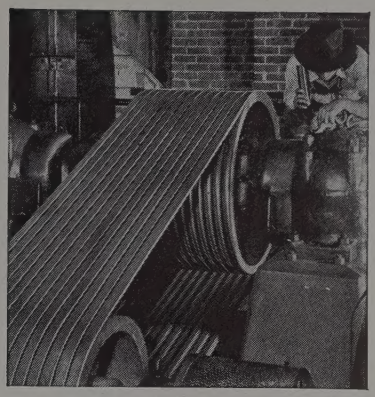
UNDIES TO TIRES

At first, rayon was used mainly in making articles of clothing. However, with an improved tire cord in mind, Du Pont scientists set out to produce a tougher rayon than any previously known. The problem was given to a skilled team whose members included organic, physical and analytical chemists, physicists, and chemical and mechanical engineers.

One of their first discoveries was that strength could be increased by using cotton linters as the source of cellulose, in place of wood pulp. It was found, also, that the viscose solution had to be prepared and handled with extreme care. Perhaps the most important lesson was one which the silkworm had taught centuries before: *stretching increases strength.* The Du Pont experimenters stretched the new yarn and made rayon with a tensile strength of about 70,000 pounds to the square inch—more than twice the strength of textile rayon then being produced.

TRIED AND PROVED

With the cooperation of tire manufacturers, "Cordura" was tested in heavy-duty tires on baking-hot desert roads. During the war it proved itself on command cars, trucks and jeeps. Today, rayon-cord tires are widely used on trucks and buses, and leading manufacturers use Du Pont "Cordura" in tires they make for passenger cars.



V-belts of "Cordura" and rubber keep even tension, far outlast others.

The combination of lightness and strength offered by "Cordura" has also earned it a welcome from makers of conveyor belts, V-belts and hose for domestic, agricultural and industrial uses. It is used to reinforce laminated kraft paper, to tie wires to electrical switchboards and as a chain warp in carpets to bind the wool tufts firmly in place. One of the newest uses is in plastic clotheslines. The Du Pont Company makes none of these articles. But because Du Pont scientists had an idea and the facilities and funds to develop it, many businesses can now offer you better products to make life safer and more enjoyable.

*REG. U. S. PAT. OFF.

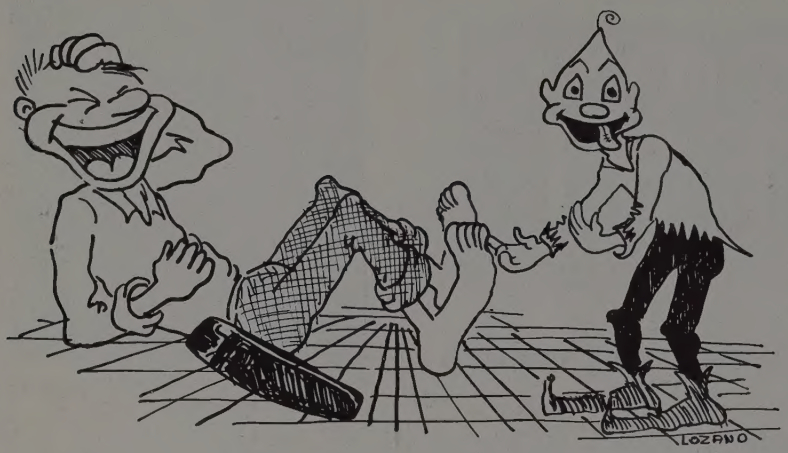
SEND FOR "The Story of Cellulose," a 43-page, illustrated booklet that describes the making of viscose and acetate rayon, lacquers, plastics, coated fabrics, etc. Many charts and equations. For free copy, write to the Du Pont Company, 2503 Nemours Building, Wilmington, Delaware.

DU PONT

REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY

Great Dramatic Entertainment—Tune in "Cavalcade of America" Tuesday Nights, NBC Coast to Coast



TECHNOCRACKS

Dear Readers, do you want to lose all your friends? If you do, we have taken space out of this page of "Technocracks" to bring to you a collection of jokes(?) so old and shop-worn that we will unconditionally guarantee a total loss of friends if you pull them off in polite society. Hold your noses, for here we go:

* * *

"Is that a Jersey cow?"

"I don't know. I couldn't see the license plates."

* * *

Quibble: "My pen is just itching to start on a novel."

Nibble: "Well, here's some scratch paper."

* * *

A bookcase is always one for the books.

* * *

C.E.: "Is kleptomania catching?"

M.E.: "No, son, it's taking."

* * *

Sis: "I think there's company downstairs."

Junior: "How do you know?"

Sis: "I just heard Mom laugh at Pop's joke."

* * *

Hy: "Do you find it difficult to eat soup with a mustache?"

Cy: "Yes, it's quite a strain."

* * *

There's no future in a history book.

* * *

"Junior, are you spitting in that fishbowl?"

"No, but I'm coming pretty close to it."

* * *

He: "I won the election."

She: "Honestly?"

He: "Now why bring that up?"

Is your blood fizzling by now, Reader? If you still can't lose your friends, here are some antiquated mirthquakes dug out of Roman ruins:

Aristclastines: "We're not making much money out of the amphitheater."

Washdedishocles: "No, the lions are cating up all the prophets."

* * *

Once upon time there were three bulls; a big bull, a medium-sized bull, and a little bull. They were walking along a road one day when they suddenly came upon a field of curvaceous Conover model cows who looked at them with droopy eyelids and come-hither glances. The big bull panted rapidly and said to his two fellow bulls, "Well, boys, I guess this is where I leave you!"

So saying, he jumped over the fence for the cows. Rather disgusted with his antics, the medium-sized bull and the little bull continued on down the road in the warm sun. Shortly, though, they came to another field of Powers model cows. This time the medium-sized bull became smitten with love and said to his little companion, "Well, fellow, something like this can't be passed up. So long, pal!"

So saying, he jumped over the fence and was off. The small bull turned around, faced up the road, and continued on and and on . . .

Now the moral of this story is that a little bull goes a long way.

* * *

An old Army story tells of a close-mouthed Major that made the Sphinx look like a chatterbox. One day, when a sergeant appeared before him for disciplinary action, the office personnel listened at the door, expecting to hear a good bit more than the Major's usual one-word sentences. They were disappointed.

"Come in, sergeant. At ease. Attention, private. Dismissed."

* * *

A woman appeared in a psychiatrist's reception room one day and caused a bit of commotion by the companion she brought along, a 6-foot ostrich.

When her turn came to enter the specialist's office, he stared and inquired. "Sit down, madam, and tell me what is wrong with you."

"Oh, it's not me, Doctor," she replied. "It's my husband. He thinks he's an ostrich."

* * *

She tenderly whispered, "Am I the first girl you ever kissed?"

The engineering reply was: "As a matter of tact, yes."

* * *

A copyreader on an Illinois newspaper couldn't believe his eyes when he read a cub reporter's account of the theft of 2,025 pigs. Calling the farmer who had been the victim, he asked, "Is it true that you lost 2025 pigs?"

"Yeth," lisped the farmer.

"Thanks," said the copyreader, correcting the copy to read, "two sows and 25 pigs."

* * *

A prominent business man got home early one morning to find his wife awake and waiting. He flustered, turned red, and bravely stuttered, "Well—ah—I ran into an old flame in town last night. We just stopped to have a few drinks and kind of reminisce. Well—uh—then she invited me up to her apartment for old times' sake—and—well—one thing led to another—so—here I am—"

"Don't lie, you heel!" the wife exploded. "I know you were out all night playing gin rummy with the boys!"

* * *

A lot of guys may have their little black books, but the iceman has his pick.

* * *

From a road sign:
They missed the turn, car was whizz'n;
Fault was her'n; funeral his'n.

Crossword Answer

W	E	T		U	S	E	R	S		D	A	F	T	
E	R	A		P	I	X	I	I		A	R	E	A	
B	E	L	L		D	I	M		W	R	I	S	T	
		C	A	R	E	T		R	E	E	D	S		
A	D		Y	E	S		W	I	N	D		E	S	
N	A	K	E	D		W	A	T	T		A	N	T	
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I	R	O	N		C	H	I	N	S		R	U	E	
E	T	N	A		L	E	D	G	E		N	E	T	